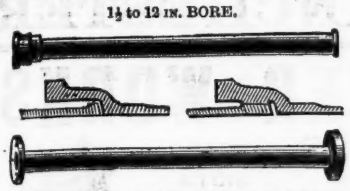
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVI. No. 1682.] LONDON, AUGUST 6, 1895. [47TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1½ to 12 IN. BORE.



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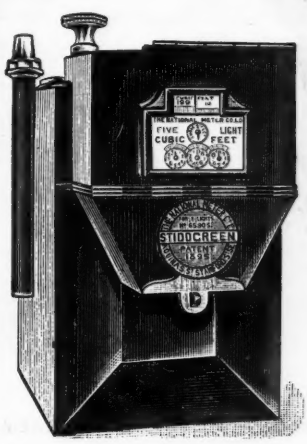

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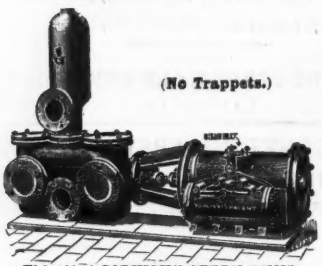

Fig. 600. "CORNISH" STEAM-PUMP FOR WATER.

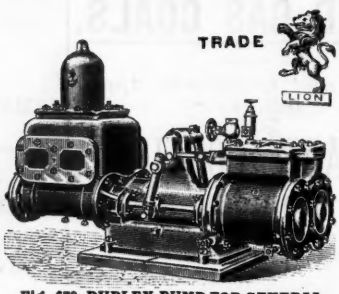

Fig. 670. DUPLEX PUMP FOR GENERAL PURPOSES.

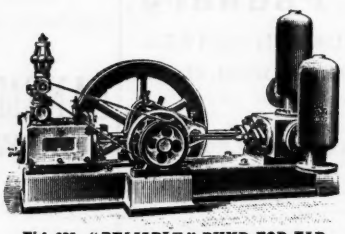

Fig. 685. "RELIABLE" PUMP FOR TAR AND THICK FLUIDS.

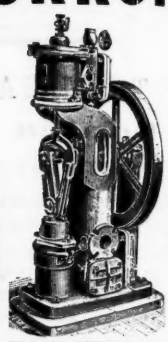

Fig. 705. SINGLE RAM PUMP FOR BOILER FEEDING, &c.

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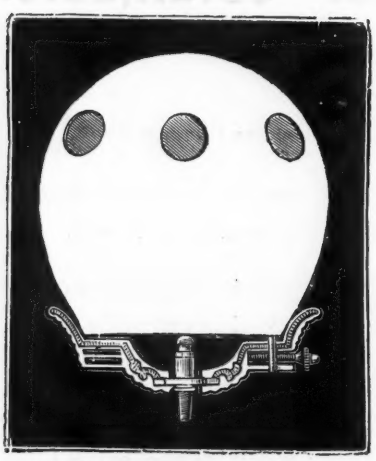

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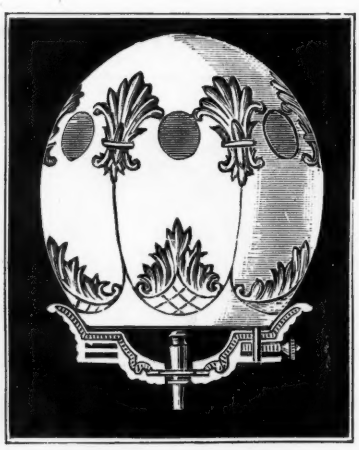

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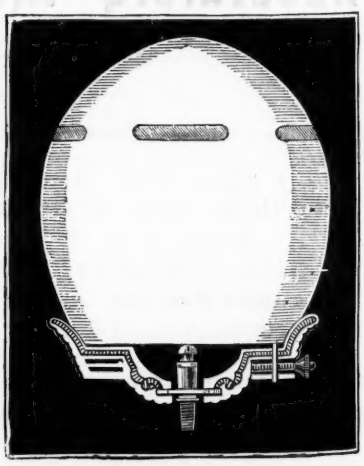

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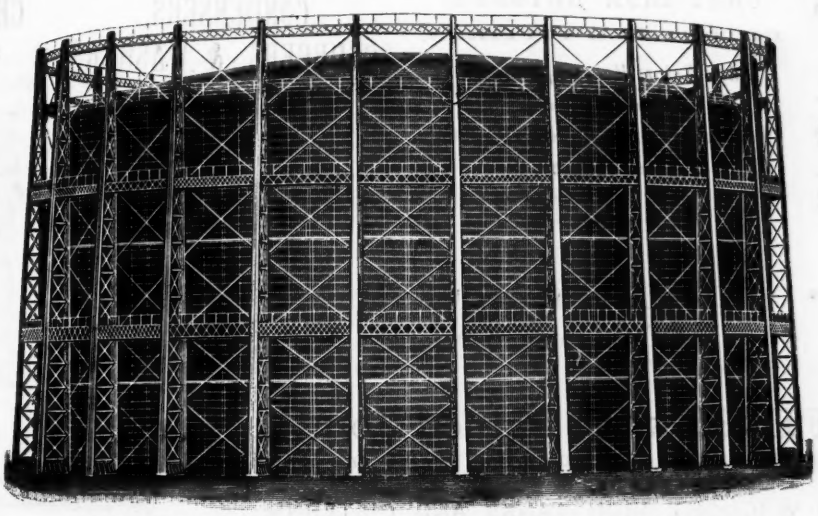

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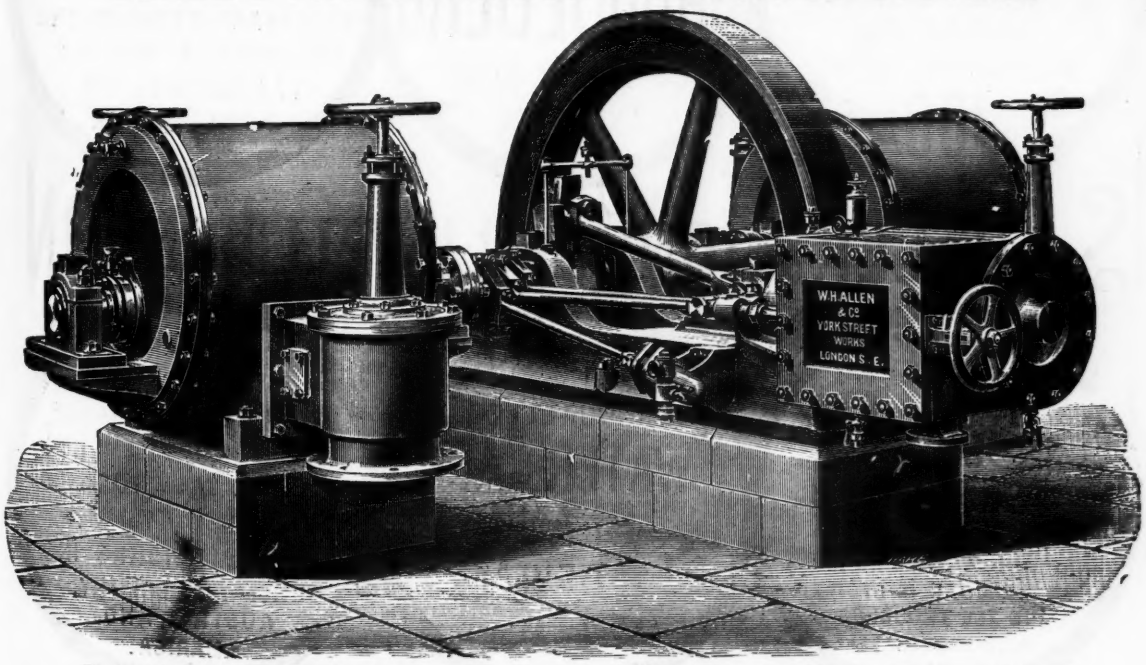

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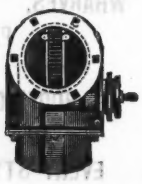

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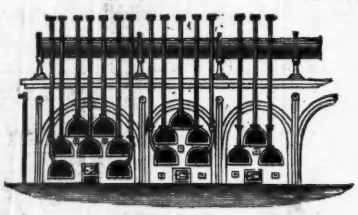

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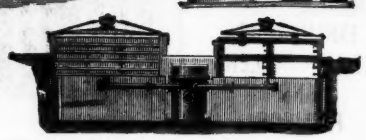

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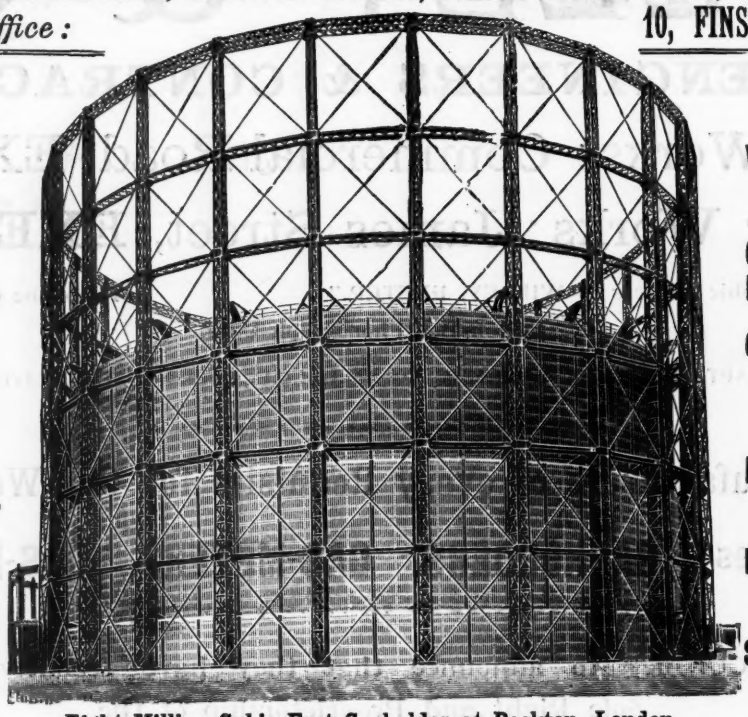

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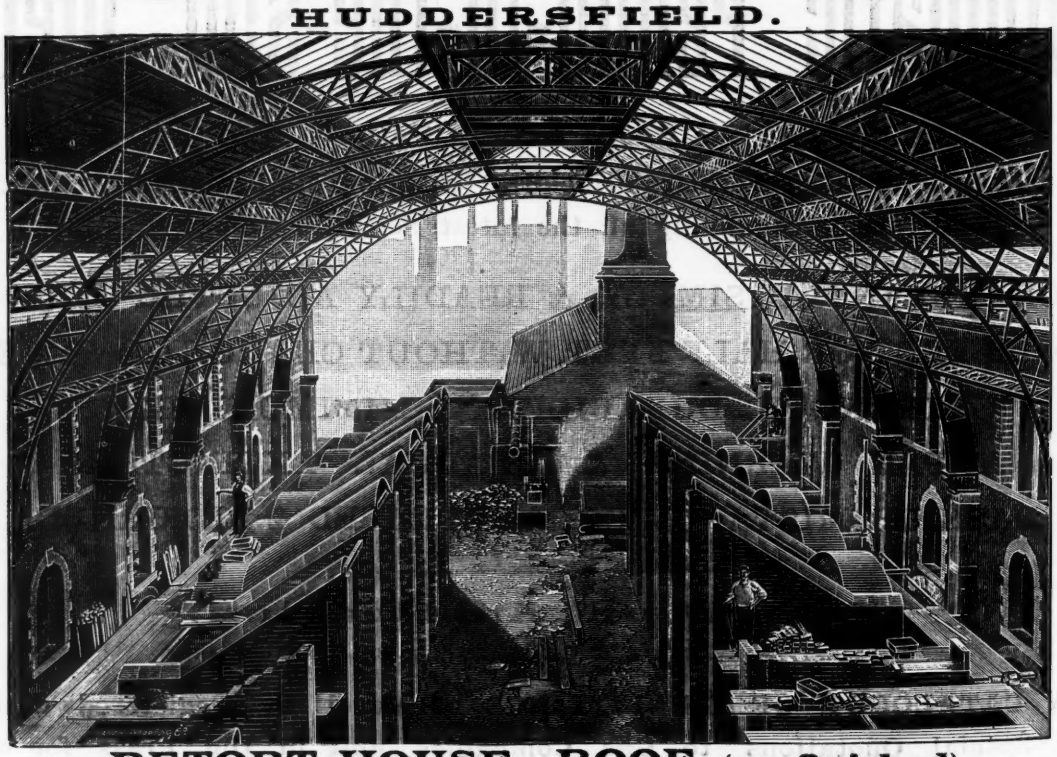

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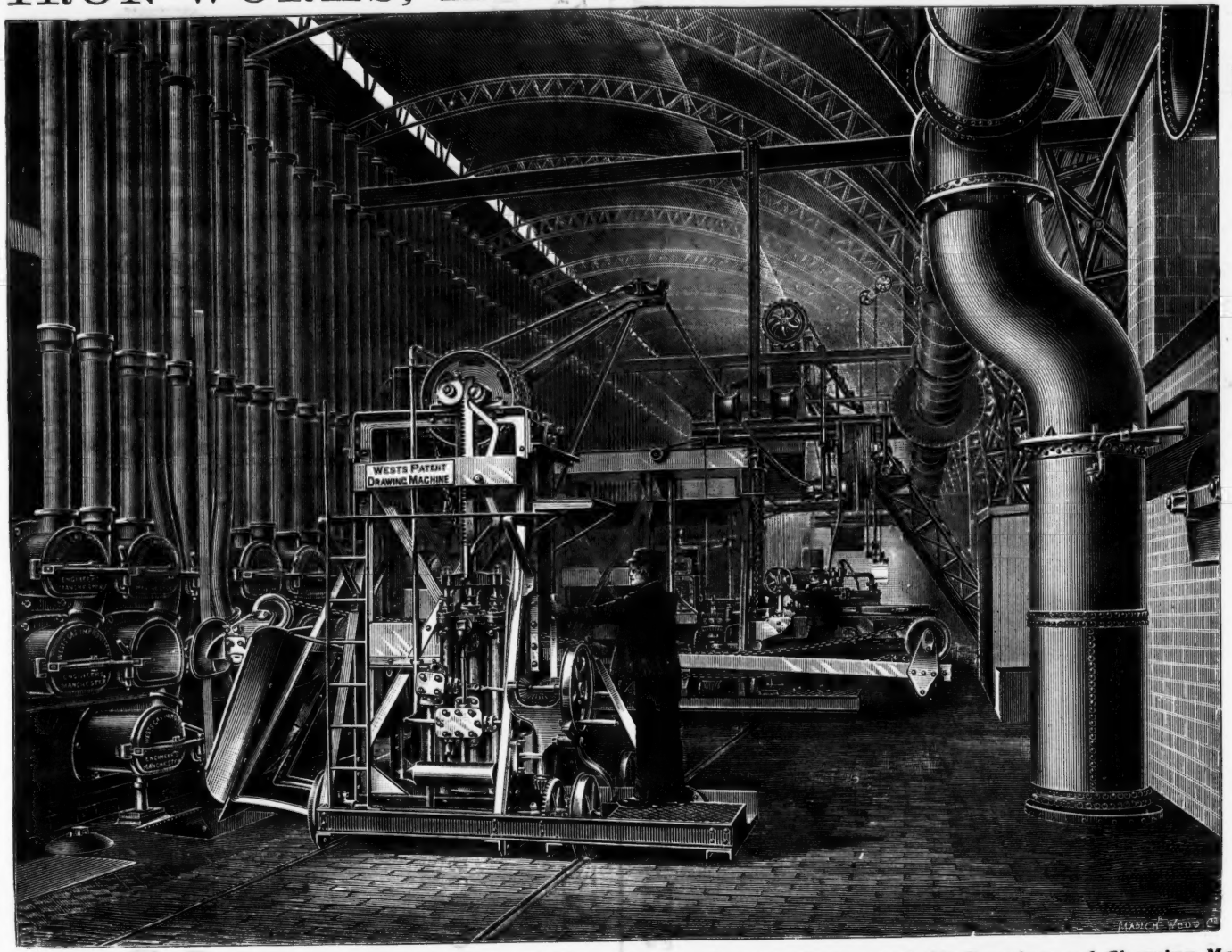

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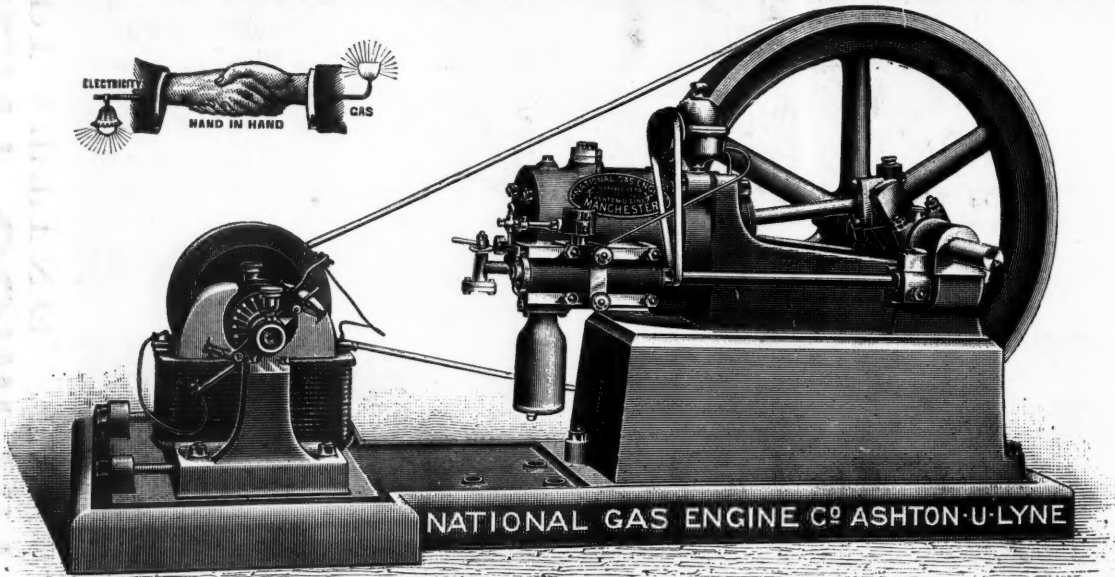

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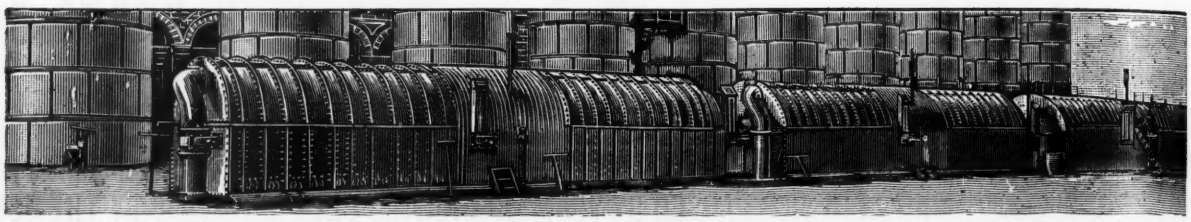
☞ **492** of these Machines (capable of dealing with **472,540,000** cubic feet of Gas daily) in use, which fact is given as evidence of this apparatus being the Most Efficient of any in the Market for the extraction of Ammonia, Carbonic Acid, and Sulphuretted Hydrogen from Coal Gas.



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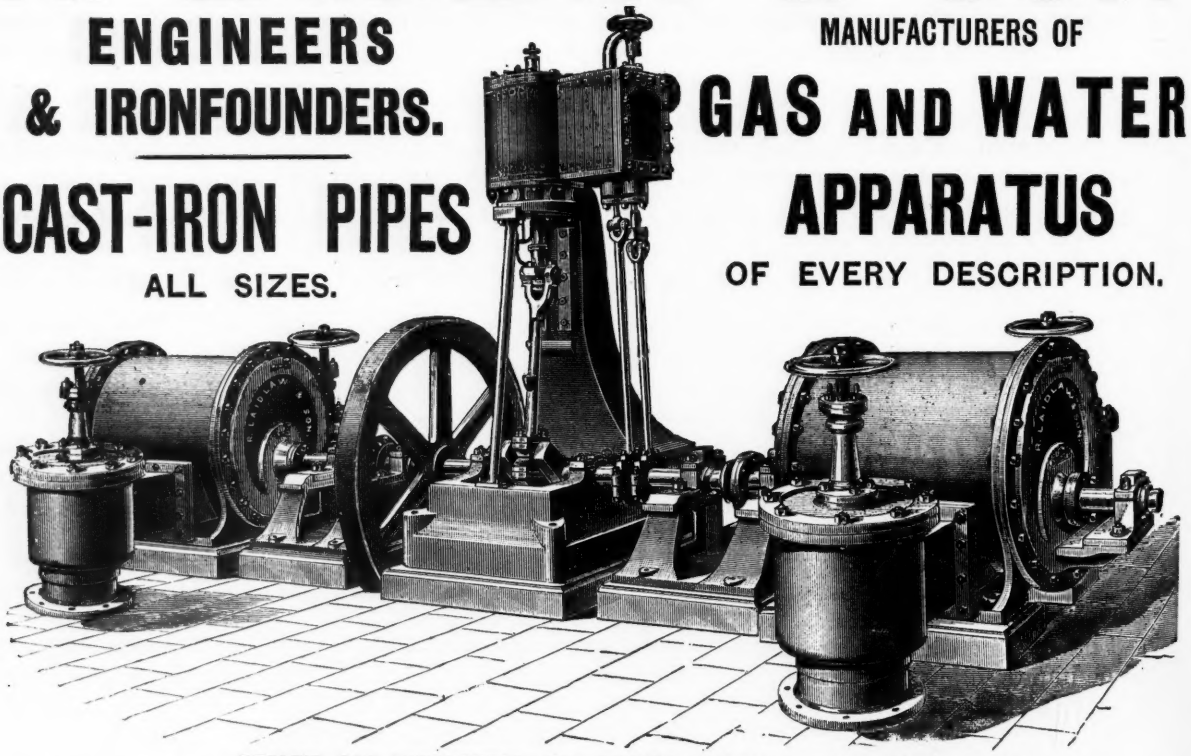

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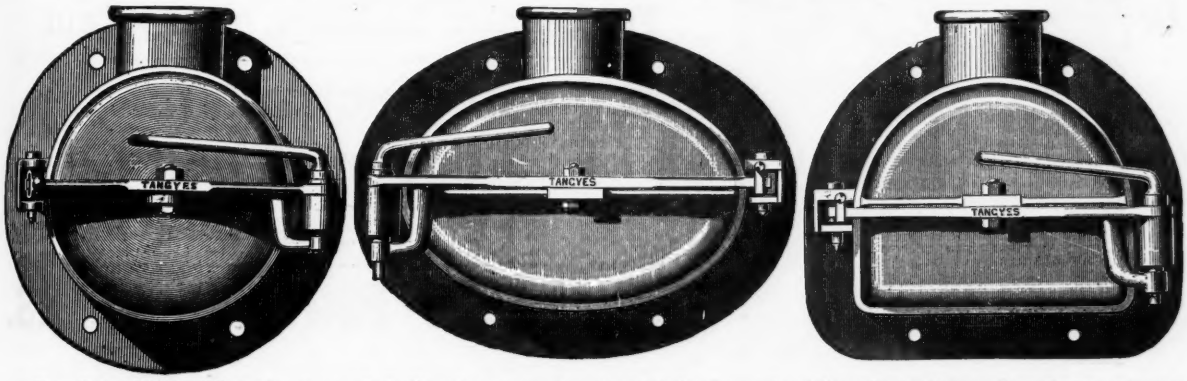

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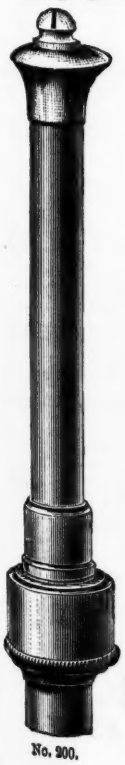

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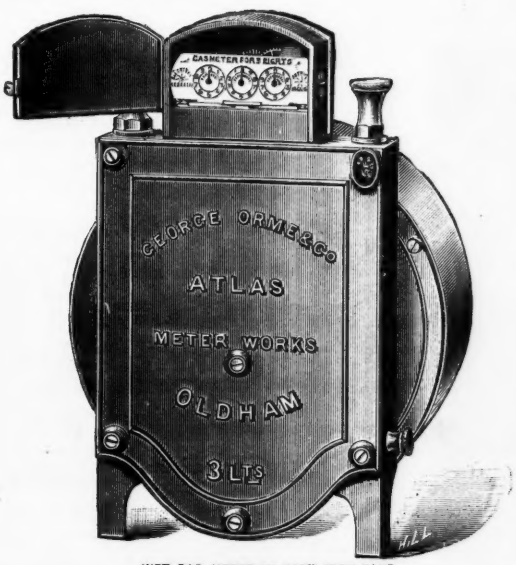

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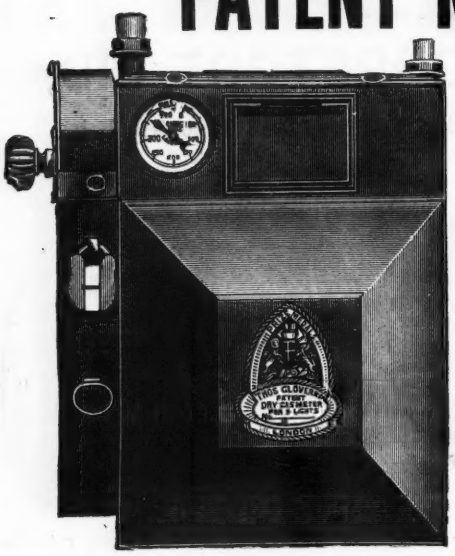

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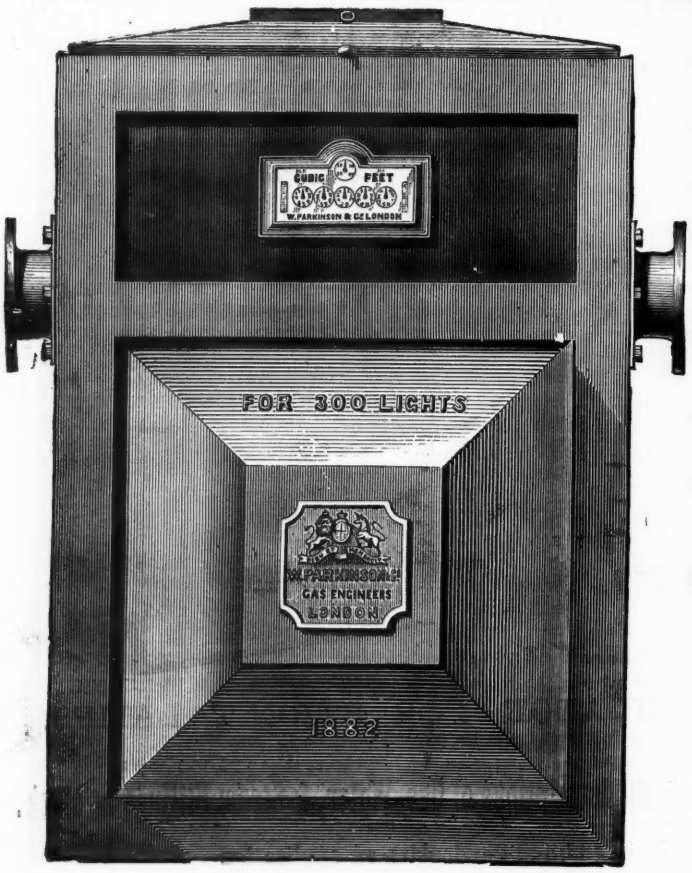

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CONTENTS.

EDITORIAL NOTES:—
GAS, LIGHTING, &c.— PAGE
The Chartered Meeting . . . 277
The South Metropolitan Report . . . 278
Manchester Gas Affairs . . . 278
Dr. Thorpe on Gas Enrichment . . . 278
WATER AND SANITARY AFFAIRS—
The Scarcity of Water in East London—Reports to the London County Council; *The Times* on the Question . . . 279
Water Consumers' Rights and Duties . . . 280
Water Supply and Sanitation in India . . . 280
ESSAYS, COMMENTARIES, AND REVIEWS:—
Gas and Water Companies in the Stock Market . . . 281
Electric Lighting Memoranda . . . 281
A New Suggestion in Economics . . . 282
A New Incandescent Gas-Lighting System . . . 282
NOTES:—
The Behaviour of Building Bricks under Heat . . . 283
Glass Sand for Brick Making . . . 283
A Question of Ether . . . 283
The Occlusion of Hydrogen by Platinum Black . . . 283
TECHNICAL RECORD:—
Messrs. Gwynne and Co.'s New Patent Exhauster . . . 284
Society of Chemical Industry—Dr. Thorpe on Gas Enrichment and the Future of the Gas Industry . . . 284
Institution of Mechanical Engineers—Mr. A. S. Biggart on Hydraulic Stoking Machinery and Labour-Saving Appliances in Modern Gas-Works . . . 285
North British Association of Gas Managers—The Standardizing of Meter Unions. By J. Napier Myers, of Saltcoats . . . 287
REGISTER OF PATENTS:—
Heating and Illuminating Gas—Daus, E. . . . 289
Prepayment Meters—Orme, D. . . . 289
Gas-Washer—Pettigrew, G. . . . 290
Incandescent Gas-Lamps—Moeller, J. . . . 290
Washing and Scrubbing Gas—Walker, C. C. . . . 291
Conducting Air to the Flames of Gas-Burners—Schulke, A. H. J. . . . 291
Patent Notices . . . 291
CORRESPONDENCE:—
Mr. Young's Paper at the North British Association . . . 292
Effect of Admixture of Gas and Air on the Illuminating Power of Gas . . . 292
Gas-Flames and Luminosity . . . 292
The Lighting of the Victoria Embankment . . . 292
LEGAL INTELLIGENCE:—
High Court of Justice—Queen's Bench Division—Southwark and Vauxhall Water Company *v.* Evershed . . . 292
Croydon Quarter Sessions—Croydon Gas Company *v.* Assessment Committee of the Croydon Union . . . 293
Assessment of the Australian Gas Company's Mains . . . 294
MISCELLANEOUS:—
Meeting of The Gaslight and Coke Company . . . 294
South Metropolitan Gas Company—The Directors' Half-Yearly Report . . . 296
Meeting of the Brentford Gas Company . . . 296
Meetings of the Incandescent Gas-Light and Share Companies . . . 297
Provincial Gas and Water Companies . . . 298
Electric Lighting Notes . . . 298
The London County Council and the Water Question—The Scarcity of Water at the East-End; The Proposed New Sources of Supply for London . . . 299
Notes from Scotland . . . 300
Current Sales of Gas Products . . . 300
Coal Trade Reports . . . 301
Gas and Water Companies' Stock and Share List . . . 302
PARAGRAPHS:—
Mr. Leo Taylor, F.I.C., F.C.S.—Mr. W. B. Jackaman . . . 279
The Gas Interest in the New Parliament—Mr. G. H. Hill—Dust Destruction and Electric Lighting—Mr. E. K. Burstal, M.Inst.C.E.—Scarcity of Water in New York and Chicago . . . 280
Presentation to Mr. W. Yates . . . 281
Sewer Ventilation . . . 283
Effect of Gas-Stoves on Coal Traffic—Society of Chemical Industry 289
A City Electrical Laboratory—Sales of Shares . . . 299
Electric Lighting at Derby—The Inclined Retort System at Huddersfield—The Ackworth, Featherstone, and Purston Gas Company—Portland (Oregon) Water Supply—An Interesting Reminiscence—The Proposed Auxiliary Water Supply from Wales—The Payment of Wages during Periods of Sickness . 301
Incandescent Gas-Burners for Public Lighting—Reduction in Price—Serious Explosion of Gas at Lodz—The Public Lighting of New York—Improvements at the Shepshed Gas-Works—The Finances of the Manchester Corporation Gas Department—Colne Water Supply—The Ossett Town Council and the Gas Question—Gas Affairs at Ripon—The Purchase of the Rastrick Gas-Works by the Brighouse Corporation—Sick and Funeral Society of the Leicester Corporation Gas and Electric Lighting Department—The Price of Gas for Public Purposes at Swansea—Polluting Lancashire Rivers . . . 302

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EDITORIAL NOTES.

The Chartered Meeting.

THE meeting of the proprietors of The Gaslight and Coke Company last Friday was a very tame affair. It was not largely attended; and this was fortunate, in the circumstances, as the scene was changed from the great hall on the ground floor, in which these meetings are generally accommodated, to a smaller chamber on the upper floor of the Horseferry Road building. The Governor—Colonel Makins—presided, and exhibited a commendable restraint in speaking of the affairs of the Company and of other people. He did not stir anybody up by sarcastic observations; and consequently the proceedings subsequent to his speech were but brief and unexciting. The Company have done very well of late. There is no gainsaying this fact; and we are glad to recognize it, and give credit where credit is due—which in this case is to the station managers. Circumstances have enabled the Company to sell more gas, and the carbonizing staff and workpeople have made more, and made it at a cheaper rate, than has been recorded for the undertaking of late years. Moreover, a check seems to have been imposed upon the growth of capital outlay upon unproductive works; and not before it was time. The Governor spoke warmly for the station managers in regard to the improvement that has been brought about in the fuel account; and he also very properly praised the distributing staff for their devotion to duty during the past winter. All this is amply deserved by the recipients of the Governor's laudation. The Gaslight and Coke Company have in their service as good men in every rank and office as ever engaged in the industry of gas lighting; and the more this is recognized at head-quarters, the better it will be for the undertaking.

It must be conceded that the Governor spoke on Friday under a certain disadvantage, due to the announcement of a reduction in price by another penny per 1000 cubic feet by the South Metropolitan Company, to which we gave publicity last week. This means, of course, a corresponding reduction of revenue from public lighting, and from the Surrey-side district supplied by the Chartered Company, and an increase of the inequality between the prices charged for gas north and south of the River Thames. But if Colonel Makins was annoyed at this step on the part of the Directors of the Company which his own undertaking are obliged to follow, he kept his feelings to himself on Friday. It is true that his repeated declarations about the necessity for caution in altering the price of gas, and the obligation that exists for considering all the circumstances of an undertaking before anything of the kind is done, bore directly upon the conditions created for the two Companies by the action of the South Metropolitan Board. But he never mentioned this action; and so the matter passed.

There were two points made by Colonel Makins in the course of his speech, as to which some question might be raised in the best interests of the community and of the Company. The first was in connection with the Company's adventure into the field of automatic prepaid supply, which it seems is as yet restricted to particular portions of the Company's district. The Governor said, in the most matter-of-course manner, that there are no automatic prepayment meters in the whole West-end, which his hearers were left to infer is much too aristocratic a region to require such accommodation. While there are upwards of 6000 applicants for these meters still waiting their turn to be equipped with these true "poor "man's friends," it is hardly reasonable to ask the Board to reconsider the case of the West-enders. We are not informed as to what precise topographical meaning attaches to the term "West-end" in the official vocabulary of the Horseferry Road. But, taking the term as Londoners use and understand it, we dare aver that there are in the West-end of London very many poor people who would be glad of a supply of gas upon the cash system; and it is by no means clear why a single one of these should be debarred from participating in the advantage which the Company are willing to extend to others, simply because he lives near neighbours far richer than himself.

The other questionable topic dealt with by the Governor was the matter of the storing of residuals by the Company, with the object of dodging the market. Colonel Makins

tacitly admitted the truth of our hint of last week as to the existence in the Company's stores of large stocks to certain products; and he supported the policy of holding such stocks to sell, as is imagined, to advantage at favourable opportunities. We believe, on the contrary—and are supported in the belief by the opinion of most of the managers of gas-works in which residuals are worked up, outside the Chartered Company—that this policy is quite a mistaken one. Where the seller is a public company or corporation, the favourable opportunity for realizing stocks which have once been allowed to accumulate never comes. There is no good theoretical reason why this should be so; but so it is. Official sellers are no match for the trade; and the knowledge possessed by the latter of the amount of stocks held by the former, subject to the obligation to realize at some time or other, effectually keeps down the market rate. It is not as if the products works—say, of the Chartered Company—were an independent, dividend-earning concern, which the Directors were bound to study as their principal business. If all the sulphate at present held by the Company were to be shipped out to sea in the London County Council sludge-boats, and tipped overboard in the Middle Deep, the Company's dividends would not suffer. Why, then, should the Directors be at the pains to try and work the market for the sake of making some problematical profit which never comes to hand? Sooner or later, the man who tries to work this string so cleverly gets tired, and throws all the accumulated store upon the shrinking market. Down go prices; but who cares? Where is the superiority of this would-be clever method of selling, over a regular course of auction sales which would return to producers the values of the day, as well as relieve the market from the terror of impending mountains of stocks?

Some interesting remarks upon municipal methods of finance and incandescent gas lighting served to fill out the Governor's speech; and there was no discussion. On the whole, Colonel Makins did very well on Friday; and if the Chartered Directors will only continue to show themselves as amenable to worthy outside leading as they have been in the matter of automatic prepayment meters, and—to name one opening for amendment—will reconsider their policy of dealing with residuals, they will yet earn the thanks of the gas profession at large.

The South Metropolitan Report.

THE Directors' report and the statement of accounts relating to the last half-year's working of the South Metropolitan Gas Company have been issued; and the general meeting will be held on the 14th inst. There are special reasons why as many proprietors as can possibly make it convenient to attend this meeting should do so. The Board have to make an important communication to them respecting the fate of the recent abortive stock-conversion scheme; and much will depend upon the statement of opinion in regard to this matter that may be the outcome of the meeting. All that the report says on the subject is that the Board had to withdraw the Bill of last session; but it is significantly added: "In these circum-"stances, the Directors desire the opinion of the proprie-"tors as to the expediency of re-introducing the Bill next "session." We are unable to publish the accounts this week; and we must therefore confine our observations to the substance of the report, which will be found in another column. At the outset, formal announcement is made of the reduction in the price of gas by 1d. per 1000 cubic feet as from the Midsummer quarter. This price—2s. 3d. per 1000 cubic feet—is a return to the lowest figure ever charged for gas in the Metropolitan area; and it is difficult to see how it can get much lower. And at the same time coke and ammonia are also exceptionally low. Coal is, of course, cheaper; but this consideration does not explain the favourable state of the accounts for the half year, which is due mainly to the extraordinary growth of the consumption, partly caused by the severe winter. The increase has been at the rate of 13 per cent. for the whole period—probably the fastest development ever recorded for a London gas undertaking at any time. The number of consumers continues to increase. During the past half year, 6817 automatic prepayment meters were fixed; bringing up the total number in use on June 30 to 32,333. This is an astonishing tale of expansion. The surplus profit realized for the six months over the amount needed to pay the nominal 13 per cent. dividend is applied to building up the reserve and insurance funds so sadly depleted in the years 1889 to 1892. Of the wisdom of this policy, there can be no doubt. As already remarked, the general meeting ought to be well attended, as the proceedings are certain to be both interesting and of high political importance.

Manchester Gas Affairs.

THE report and statement of accounts issued by the Gas Committee of the Manchester Corporation for the year ending March 31 last are, as usual, clear and comprehensive. The consumption of gas showed an increase of 4·28 per cent. for the year, mainly due, of course, to the exceptional weather of February and March, which taxed the resources of the works to the utmost, especially in the daytime. Thanks, partly, to the increased demand, the proportion of unaccounted-for gas further dropped to 2·81 per cent., which is a very creditable figure. Large additions are recorded in the numbers of stoves, engines, and automatic prepayment meters, which means that the community are becoming more and more alive to the capabilities of their gas supply. The average consumption of the prepayment meter customers only works out to something like 4300 cubic feet for the year; but the computation is probably vitiated by the short time during which most of them were in use. The gross profit on the year's working was £134,692. Of this amount, only £30,299 was required for interest on capital, and £13,954 for repayment of loans; leaving what is called a net profit of £90,438. The annual subsidy to the City Fund takes £54,044. In February last the City Council ordered a reduction in the price of gas by 3d. per 1000 cubic feet, and the abolition of meter-rents within the city. The undertaking can very well afford these concessions, as we argued at the time. They will represent a reduction of revenue of £56,100 for the current year. But cheaper coal and cannel will go a long way towards making up for this estimated loss; and increased consumption and progressive management ought to answer for the rest. After all, gas sold in Manchester at the present price—2s. 3d. per 1000 cubic feet—cannot be considered too cheap, even from the point of view of a member of the Gas Committee. There is plenty of profit to be made by selling it at this price, as will in all probability be realized during the next two or three years. Usually five or six years are allowed to pass without alteration in the selling price of Manchester gas; so that meanwhile the Committee will have plenty of breathing time to settle their finances on the new basis.

If one might tender a little advice to the Committee in the circumstances, it would be concerned with their treatment of their consumers and staff and workpeople generally, which might be inspired by a more generous spirit. The Manchester Corporation gas undertaking is not now a struggling concern in which it might be supposed to be necessary to cut everything down to the smallest margin of cost, especially salaries and wages. Without going into particulars in this respect, it is sufficient to note for the exemplification of our meaning that in the list of "miscel-"laneous expenses" of this great undertaking will be found these donations: To the Royal Infirmary, a 50-guinea subscription; to the Royal Eye Hospital, £20; contribution to the Manchester Corporation Thrift Fund, £428. It is true that the Manchester Corporation are not much, if at all, stingier than other trading Corporations; but really this short list of benefactions cannot be deemed creditable to any public authority. We are not in favour of coddling employees of corporation committees, or doing anything out of the way to render corporation employment too seductive to the populace and at the same time putting other local employers at a manifest disadvantage. But could not the Manchester Gas Committee do something to help forward a solution of the problem of old-age pensions? Where is their helpfulness of the research work of the Victoria University? These inquiries are not meant to be impertinent; and we trust our motive in putting them will be seen in a proper light by those whom it may concern.

Dr. Thorpe on Gas Enrichment.

IT must be considered a matter for congratulation by followers of the gas industry, that, on such an occasion as the annual meeting of the Society of Chemical Industry, the President should have seen fit to devote a considerable portion of his Inaugural Address to the subject of coal gas enrichment. The meeting was held in Leeds last

Wednesday; and the President for the year is Dr. T. E. Thorpe, who is at the head of the Somerset House Laboratory, and was formerly Professor of Chemistry at the Yorkshire College. His competency and independence are therefore unimpeachable; and, as we have repeatedly acknowledged, it is a great advantage for outsiders of such eminence to tell gas technicians what they think of their aims and methods. As it happened, the gas industry was the first special subject mentioned by Dr. Thorpe, from which it may be supposed that its condition and prospects occupy a foremost place in his thoughts at the present time. He remarked upon the fact that the extinction of the industry was confidently predicted some years ago, by certain prophets of a new light that was imagined to be ready to dispossess it of its place among the appliances of civilization; but he acknowledged that chemists at least would be very sorry to see gas-works abandoned. Dr. Thorpe described a gas-works as similar to a town with many staple trades, each acting and reacting upon the prosperity and development of the others. "This very potentiality, indeed, afforded the "strongest assurance of its continued existence; and with "each fresh economy in production, with each new "application as a source of power, with every new dis-"covery in the use to which the countless products of "the destructive distillation of coal could be put, the "industry acquired a new lease of life. The tendency of "modern life was more and more to turn night into day, "and 'Light, more light!' was the ever-constant cry." These are words of sound practical wisdom, supported by incontrovertible evidence.

Somewhat suddenly after this exposition of generalities, Dr. Thorpe descended into a review of the particular question of gas enrichment, without stopping to discuss the "previous question" of whether such a process is required at all, and, if so, to what extent it is desirable. We should have liked to hear Dr. Thorpe's views upon this head. As it happened, he passed it over without so much as recognizing the existence of such a problem; and he quickly proceeded to a conclusion that "if benzol continued at its "present price, it would constitute the best and cheapest "enricher that could be obtained." Dr. Thorpe entertains a good opinion of oil gas as an enricher; but, with regard to carburetted water gas, he uttered a pronouncement that cannot be disregarded by those who favour the large extension of this manufacture in British gas-works. The difficulty of the carbon monoxide looms largely before the imagination of the Somerset House analyst; and it would perhaps have been better if, before expressing himself so strongly in this regard, he had prepared himself by closer study of the actual results upon the composition of the gas sent out for consumption, in the case of those undertakings which have adopted carburetted water-gas plant. Naturally, Dr. Thorpe is no more partial to acetylene than to carbon monoxide as a constituent of illuminating gas sold for general consumption; but we certainly think that, speaking in the capacity of a chemist, he should have paid some attention to quantities as well as to qualities, when treating of matters in regard to which the "public mind," alluded to by himself, might conceivably form mischievous misconceptions. It has unhappily been a trick of some analysts before Dr. Thorpe to play the part of alarmists by such cries as "there is death in the pot;" and it will be time enough to declare that British coal gas is a deadly compound when the facts are found to warrant the imputation. Very aptly, the Mayor of Leeds (Alderman Gilston), in welcoming the Society to the town, took the opportunity for drawing attention to the practical side of the enrichment question by asserting that it would cost £20,000 a year to add another candle to the illuminating power of the local gas supply. He observed upon this that even light might be bought too dear; and that this suppositious extra candle would not be worth its cost. Most people who understand the matter will heartily agree with him.

Mr. Leo Taylor, F.I.C., F.C.S., has been appointed Gas Examiner to the Leyton District Council. Mr. Taylor holds a similar position in connection with the Walthamstow District Council; and he is the Public Analyst for Hackney.

Mr. W. B. Jackaman, who has been for many years a Director of the Ipswich Gas Company, died last Thursday morning at Guernsey. The deceased gentleman (who was in the 63rd year of his age) had been in failing health for some time.

WATER AND SANITARY AFFAIRS.

Two remarkable reports relating to the water supply were brought before the London County Council on Tuesday. One came from Mr. Cripps, the Parliamentary Agent to the Council, who scouted as "absurd" the idea that the rejection of the East London Company's Bill in 1893 had anything to do with the recent insufficient supply in the Company's district. As the rejection of the Bill at that date has for the present prevented the district from receiving a large addition to the daily quantity of water, there is evidently some connection between what happened in Parliament and the interruption of the constant service in East London. But Mr. Cripps had something still more astonishing to say. He declared that "there was "no opposition on the part of the Council to the Company "making additional works." This allegation is simply incomprehensible; and it is at once qualified by Mr. Cripps's own statement, that in acting on behalf of the Council he required the Company to limit the amount of capital proposed by the Bill to that which would be necessary for the next two years. Such a restriction was, of course, simply out of the question, and rendered the opposition absolute. Mr. Cripps tries to make it appear that the Council objected to the Bill because of certain conditions which it sought to impose upon the consumers; but it is perfectly clear that if these conditions had been withdrawn, the Bill would have been opposed by the Council on account of the proposed works. Moreover, the Council have always alleged that they opposed the Bill because it would add to the capital account, and would increase the cost of acquiring the undertaking. The interests of the consumer played a very small part in the contention of the Council; and we can fancy the Progressives feeling rather surprised to find how virtuous they have been. But the question is well disposed of by a reply which the Company have given to a communication from the Council. In this rejoinder, signed by Mr. Crookenden, the Secretary, it is shown that, if the Bill of 1893 had been allowed to proceed, the supply from the wells would by this time have been increased by 3 million gallons per day, besides 7 million gallons from the reservoirs; thus precluding any interruptions in the constant supply. The letter of reply is very strongly worded, and charges the Council with being the entire cause of the recent scarcity of water in the Company's district.

Next to Mr. Cripps we have Mr. Binnie, whose report was even the more remarkable of the two. The Chief Engineer to the Council might, in some respects, serve as a very good witness for the Water Companies, or at least for the East London Company. He showed that this Company had really poured a vast quantity of water into their district. In the months of February, March, April, and May, the quantities so supplied had "exceeded any "previous record." During the first five months of the year, the supply averaged more than 53 million gallons per day. This would exceed 44 gallons per head—certainly a very large quantity, though the Grand Junction Company have given more for several years past. But Mr. Binnie contends that there has been a great and sudden increase in the rate of supply on the part of the East London Company; and he finds an explanation for this in the theory that the mains were broken by the frost in February, and that an enormous leakage has been going on ever since then—the water running away underground. Subsequent to the appearance of this report, the mains of the Company have been examined under the direction of their Engineer; but, though some pipes have been found damaged and defective, it is stated that this has not occurred to such an extent as would in any way account for the failure in the supply. Mr. Binnie, however, gives as his conclusion that what the Company are now suffering from "is not an insufficiency of supply," but an extraordinary leakage, due to the damaged state of the mains. There is water, therefore, beating all previous record, only the supply fails to reach the consumer. But the short supply only dates from the middle of July, and the pipes were broken in February. However, one thing is made clear, that there was abundance of water down to the end of May. The Council may, if they please, adopt Mr. Binnie's view as to the cause of

the present—or rather recent—difficulty; and, if they do, they must take the statistics their Engineer has cited, though these operate to the prejudice of their plea that the state of the East London supply shows there is not enough water in the valleys of the Thames and the Lea to meet the wants of London. How the County Council can manage to reconcile Mr. Binnie's report on the East London supply with their proposal to "supplement" the present system, we are rather at a loss to conceive; yet the Council decided on Tuesday to proceed with their investigations in connection with Mr. Binnie's project for an expenditure of £38,000,000 in order to obtain a supply from Wales.

In the midst of all the agitation and excitement which has been raised in reference to the East London water supply, an article has appeared in *The Times* from a special correspondent, stating that, though there has been a deficiency in the supply, there has been "nothing "approaching to a famine." The writer deprecates the "exaggerated language" which has been used on this topic, as likely, if uncorrected, to "cause a false impression, "and to create needless alarm." On the other hand, the correspondent says he found the allegations of the Company as to reckless waste of water during the month of June "amply confirmed out of the consumers' own "mouths." Following this judicious article in *The Times* —so different from what we generally find in the Daily Press—there appears a letter from Mr. Walter Hunter, in which the writer shows the practical importance of retaining a cistern in the house, even though there is the expectation of getting a constant supply. Mr. Hunter also dwells on the fact that "London householders have not "yet learned the lesson that waste of water is a grave "offence against the community at large." Light is thus dawning on the water question; and it may be safely asserted that there are few subjects on which more misapprehension exists, or concerning which there is a greater amount of unreasoning prejudice.

That it should have remained for a layman to take a new point against the Water Companies, when so many lawyers have cudgelled their brains in the effort to devise a means of getting over an explicit statutory enactment, is, to say the least, remarkable. To Mr. John B. Kyffin, a draper of the Hackney Road, belongs the honour of having raised such a point—a barren honour, however, because nothing came of the objection. There is but small chance, we fancy, of Mr. Bushby's decision at the Worship Street Police Court being set aside by any superior tribunal. Section 70 of the Water-Works Clauses Act, 1847, is about as plain in its meaning and its terms as a section can be made. That section requires the pre-payment of water-rates, not the pre-delivery of water. Whether a company insist or do not insist on their statutory rights in this respect, is a question that cannot affect the legal aspect of the case. The law is there. If a company waive compliance with its strict requirement, that is an indulgence shown to the consumer; and it should be duly appreciated. In the present case, apparently, the indulgence is not appreciated, except as a weapon that may conveniently be used in attacking the East London Water Company. The rule of law has been affirmed again and again until there is really not the smallest excuse for attempting to evade it or to explain it away. Henceforth there ought to be no more of these ingenious, but hopeless, arguments. If a water consumer wishes to proceed against a company, he may reasonably be required to begin at a proper legal starting-point. The company may or may not apply to him for his money in advance. But the consumer must see that he pays before he prosecutes. The law does not impose the duty of sending round collectors; but the consumer can always take his rates to the company's office, and the money is not likely to be refused.

If some of the newspapers that habitually rave and rant over the supposed misdeeds of the London Water Companies were to turn their attention to the question of water supply to the teeming millions of India, they might find a useful field for their energies. Some of the remarks made by the President of the British Medical Association at last week's congress would furnish our contemporaries with a telling text for the discourse. In India, according to Dr. Ernest Hart, there is the most ignorant and monstrous opposition to the diffusion of modern knowledge on the subject of water-poisoning and sanitation. The deadly trammels of red-tape fetter the action even of those members of the medical service who would fain pursue a more enlightened policy. The system is so ill-judged and cumbrous that it becomes almost impossible to trace the sanitary history of any body of troops; while in the sanitary reports of the officials may be read signs of intense discouragement on the part of the writers, and evidence of perfunctory compliance with the duty of filling in innumerable forms, "dictated apparently in a pure spirit of "book-keeping." A strong indictment, truly, when coming from an eminent medical authority; and there is only too much reason to believe that the charges are in no respect exaggerated. In the whole of the Bombay, Madras, and Burmah Presidencies, there is no skilled examiner of water. A bacteriological laboratory is unknown where it is most wanted; and—folly of follies—medical officers are not even allowed the use of microscopes, unless they provide them at their own expense. In view of such astonishing and discreditable facts, who can question the justice of Dr. Hart's earnest claim for the appointment of a Royal Commission or a strong Departmental Committee, whose duty it should be—without the delay that is only too common in such inquiries—to demonstrate the truth or the inaccuracy of those allegations, and recommend a prompt and efficacious remedy. The President of the British Medical Association asserts, meanwhile, that upwards of 1,250,000 deaths occur annually in India from malarial infection, and nearly 750,000 from cholera; while our English troops are decimated by typhoid fever owing to the present condition of the water supply.

The Gas Interest in the New Parliament.—In addition to the members of the new Parliament whose names we have already given as being associated with the gas industry, Mr. J. T. Firbank, who has been chosen to represent East Hull, is a Director of the Newport (Mon.) Gas Company.

Mr. G. H. Hill, the Engineer of the Manchester Corporation Water-Works, has been appointed by the Sub-Committee of the Works Committee of the Edinburgh and District Water Trust, to advise as to the construction of the embankment and works for the new reservoir on the Talla, in order to secure that it shall be sufficiently strong for the public safety.

Dust Destruction and Electric Lighting.—We learn that Mr. F. Hastings Medhurst, M.Inst.E.E., of Westminster, has been instructed by the Hackney Vestry, of which he is the Consulting Electrical Engineer, to prepare for the parish a scheme of electric lighting in conjunction with dust destruction. Mr. Medhurst, it will be remembered, read a paper on "Electricity Supply from Town Gas" at the meeting of The Gas Institute.

Mr. E. K. Burstal, M.Inst.C.E., of Messrs. Stevenson and Burstal, of Parliament Street, has received instructions from the Santos Improvement Company to proceed to South America on the 6th prox., to report generally upon their undertaking, and as to the advisability of making considerable extensions in respect alike of sources of supply and distribution. His partner (Mr. E. H. Stevenson) is just returning from a professional visit to Canada in connection with large gas undertakings.

Scarcity of Water in New York and Chicago.—A great outcry has lately been raised at the enforced curtailment of the water supply at the East-end of London, consequent upon the recent unusual drought. In the opinion of many, the water service is much better managed in America than in this country; but, according to reports just to hand, it has not been altogether satisfactory in New York, while Chicago has been absolutely on the verge of a water famine. We learn that all over the former city there has been a notable decrease of water during the past few months, and complaints have been freely made by the occupants of the higher parts of buildings. In one house, only a few hundred yards distant from an aqueduct station, the only water received on the upper floors for the last few months has had to be pumped into a tank on the roof, and consequently it reaches the consumers charged with whatever impurities may have found their way into that receptacle. Many petitions, signed by hundreds of taxpayers, have lately been forwarded to the Commissioners of the Sinking Fund, urging that serious consideration should be given to the needs of the community in this respect; and asking that any water supply, under gravitation, that can be secured should be added to the present service. In Chicago, the trouble seems to be in the pumping capacity of the city water-works rather than in the sources of water. The tunnel supply throughout the city is estimated to aggregate 434 million gallons a day; but the nominal capacity of the present pumps falls short of this figure by nearly 80 million gallons. It is reported that they have never been able to furnish more than 276 million gallons in a working day; and this amount is found to be inadequate for the growing population. The subject has been brought before the City Council, and an appropriation of at least $1,000,000 has been asked for.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 302.)

In the week which intervened between a settlement and an August holiday, it could scarcely be expected that there would be a full attendance in Capel Court, or that business in the Stock Markets could be anything better than decidedly limited. And such was the case last week; but an unusual concomitant of the slack business was the fact that prices, so far from drooping, made a very fair improvement. A more cheerful feeling in such leading departments as Home Rails and the Foreign Market had a marked effect; while a conviction that the top of the tide in the Kaffir boom has not yet been reached, kept that animated market in a state of wonderful buoyancy. The Government stocks have not moved much; but several of the gilt-edged division have improved on their already wonderful prices. The Money Market remains in the same condition. Business in the Gas Market has naturally been at a rather low ebb; but it is probable that this is owing almost more to the scarcity of stock to be obtained than to any holiday influences. Short and quiet as the five-days week has been, yet substantial improvements are apparent in several quotations; while of most of those which have not actually risen, it may be said that they are only waiting for a chance of business being done in them to show their value. Gaslight "A" opened at an advance, and kept it evenly through the week; while actual business done in the "B" limited and the 6 per cent. debenture forced the quotations up freely. South Metropolitans were stagnant and untouched; people waiting to see what the half-year's report and accounts will show. A single transaction in Commercial old stock at top price was all that was marked in that line. The Suburban and Provincial division were hardly touched; and quotations remained unchanged. Among the Continentals, Imperial was fairly active, but unvaried. Union, however, had another smart rise; and European also improved. Of the rest, Buenos Ayres and Monte Video advanced fractionally. In Water, business was quite as plentiful as was to be expected. The old figures were unchanged, except in East London, which had another fall, owing to troubles in relation to its supply.

The daily operations were: The Gas Market opened strong on Monday; and prices were good throughout the list. Gaslight "A" advanced 2; and European and Monte Video, ½ each. Activity was well maintained on Tuesday, with a generally favourable tendency. Continental Union improved 5. Wednesday showed that business was getting quieter, and prices of Gas stocks stood still; but East London Water fell 3. On Thursday, many transactions were marked at higher prices; but quotations were still left undisturbed. On Friday, however, they were not to be denied; and Gaslight "B" advanced 2; and ditto 6 per cent. debenture, 2½. The Stock Exchange was closed on Saturday.

ELECTRIC LIGHTING MEMORANDA.

Tyranny in St. Pancras—Niagara at Work—The Cost of Gas and Electric Lighting.

St. Pancras seems to be supplying many lessons illustrative of the unconsidered incidental results of municipalizing electric supply. The latest news of the kind relates to an application of the London Hydraulic Power Company for permission to lay pipes in certain parts of the parish for the purpose of working lifts in some premises requiring the accommodation. The Electricity and Highways Committees of the Vestry agreed in a joint recommendation that the permission sought should be refused on the ground that "the Company must be regarded as competitors with the Vestry, inasmuch as the Electricity Department are prepared to supply the necessary power for the purpose required." Notwithstanding an emphatic protest from some members, who perceived the objectionable character of the recommendation, and strove to save the Vestry from committing an act of monopolistic tyranny, this remarkable resolution was adopted by a narrow majority; so that if this state of things holds good, any ratepayer of St. Pancras desiring to instal a power lift upon his premises, will be debarred by the Local Authority from using a system which has conferred great benefit upon the rest of the Metropolis, with the express object of forcing him to support an undertaking in which the same authority are commercially interested. It remains to be seen whether the Vestry are justified in law in thus employing for commercial reasons a power which was entrusted to them for administrative objects only. The best course the Hydraulic Power Company and their intending customers can follow in the circumstances will be to defy the Vestry, and make the latter take the case into Court. The Company cannot afford to allow their prospects to be prejudiced in this way at the caprice or to subserve the selfish aims of trading Vestries.

A remarkable letter from Professor George Forbes appeared in *The Times* of the 27th ult., describing the progress made with the Niagara Falls electrical power scheme. It has been reported that the first commercial delivery of electric current from the great 50,000-horse power generating station at the Falls has been started—the consumers using it for the reduction of aluminium. Professor Forbes claims that his plans for this undertaking have proved thoroughly successful. The Niagara Power Company are actually supplying electrical energy at variable pressure to the 1000-horse power electric furnaces of the Carborundum Company, and are arranging for the transmission of more of the same power to Buffalo, where it is to be made available for arc and incandescent lighting, for electric tramways, and for factories and mills. All this has been rendered possible, according to Professor Forbes, by his deciding, in the face of much opposition, to employ alternating currents at low speed of alternation; commuting them into continuous currents only as and when required for electro-metallurgical purposes. The price charged to local consumers at Niagara is half a farthing per Board of Trade unit; and this returns a handsome profit. Professor Forbes declares that there is no difficulty or experiment in going to great distances; this being merely a question of expense and of the value of power at the place to which it is transmitted. The Niagara Company naturally prefer to do as much business as posssible close at home. But Professor Forbes thinks there are plenty of places in the world where it will pay well to carry electrical energy 400 or 500 miles; and he has "no hesitation in saying that the low cost and perfect success, practically and commercially, of the Niagara works opens a new era in the world's industrial evolution." These be brave words; but they arrest attention and command respect on account of their basis upon an accomplished fact. Professor Forbes, like most electricians, knows how to crow; but at least, unlike the majority of his professional brethren, he has laid his egg first.

The well-worn controversy concerning the relative cost to the user of gas and electricity for lighting purposes is not yet dead, although not so much is now heard of the subject as was the case before there was a possibility of checking estimates by reference to facts. It may be revived a little by the publication of the striking figures we reproduced in our "Electric Lighting Notes" a fortnight ago in regard to the experiences of a Manchester firm, which more than bear out our habitual contention that electric lighting, when supplied from a central station, costs the consumer about three times as much as gas, in the same locality. A sudden rise of the lighting bill from £45 odd to £118 odd, is something calculated to "give pause" to the most enterprising of shopkeepers, especially when no particular countervailing advantage can be claimed for the dearer system. The electric lighting comes out badly enough on the surface of this comparative statement; but it can be made to look very much worse by supposing, as may well be the case, that the same consumer goes back to gas, and for the sake of economy and brilliant effect adopts incandescent burners. Then, light for light, the improved system of gas lighting will work out to about one-fourteenth only of the cost of electricity, taking Manchester prices for both supplies. Hence it is not to be wondered at that the electric lighting interest, as one man, anathematizes the name of Dr. Auer von Welsbach. But there is no comfort in cursing. What Welsbach lamps have done in the past, they will continue to do in the future, "only more so." And alongside them will appear in due course a brilliant crowd of devices similar, or with a similar object; and municipal and other speculators in central station electric lighting will have to face a competition infinitely more severe than anything they may have experienced up to the present time. It will not be possible for these speculators to treat all improved gas lighting systems as the St. Pancras Vestry have treated the Hydraulic Power Company; yet nothing that this Company can do to take business away from electric supply stations is worth a second thought in comparison with the havoc actually being wrought upon the prospects of such undertakings by the improved methods of gas lighting of which we are now only seeing the beginnings.

Presentation to Mr. W. Yates.—Mr. William Yates, who is retiring, for private reasons, from the position of Manager of the Hoylake and West Kirby Gas and Water Company, after acting in that capacity for sixteen years, was recently the recipient, from the employees of the Company, of a testimonial, in the form of a marble clock, as a mark of the esteem in which he is held by them. The presentation was made at the works, by Mr. A. G. Readdy, the Secretary, who spoke in the highest terms of Mr. Yates, of the good feeling which existed between him and those under him, and of the great regret they had at parting. He expressed the earnest hope that Mr. Yates would have health and happiness in his retirement. There were a good number of the men present, most of whom endorsed these remarks. Mr. Yates, who had no previous knowledge that the presentation was to be made, and consequently had an agreeable surprise, responded to the remarks of Mr. Readdy and the men in a manner which showed how strongly he felt and appreciated the good feeling expressed. The clock bore the following inscription: "Presented by the employees of the Hoylake and West Kirby Gas and Water Company, to Mr. William Yates, on the occasion of his retirement from the management. July, 1895."

A NEW SUGGESTION IN ECONOMICS.

Not many months ago, a work by an Austrian writer named Max Nordau, entitled "Degeneration," appeared in an English dress, and created a considerable sensation by reason of the fresh light thrown by the author upon some of the most remarkable aspects of modern literature and art. Encouraged by the success of this publication, Mr. Heinemann has just brought out another work of the same author, under the somewhat startling title of "Conventional Lies of our Civilization;" and in drawing our readers' attention to a portion of the contents of this book, we are actuated not by admiration of the author, but merely by the desire to place upon record a certainly striking suggestion offered by him for dealing with a recognized economic problem. Suggestions for curing the evils of the established economic and industrial system which do not fall into the categories of Socialistic or Communistic remedies are not often met with. We all know what the latter are; and most people are convinced that they are impossible. But, on the other hand, few of us would commit ourselves to a profession of faith in everything being for the best in the best of all possible worlds. It may not be, and in point of fact is not, true that, under the existing economic system, the rich are growing richer and the poor poorer, in all that constitutes real wealth. But the glaring inequalities of condition which mark the present era of man's history can be neither overlooked nor defended by those who are still persuaded that, on the whole, the course of civilization has made for the general good. How is it, we are perpetually asking ourselves, that pauperism is so peculiarly the curse of the richest communities, and that the problem of the unemployed looms largest in those countries which are most eminent in manufacturing production? Is there any fundamental error in the existing industrial system which produces this embarrassing result, and makes the pauper the noxious bye-product of a generally beneficent economic and social organization? If there is, it should be possible to distinguish and eliminate it without having recourse to the crude method of the Socialist, which would probably kill the whole body politic in the attempt to cure the diseased member. It is indeed a vital question.

"This latter part of the nineteenth century," says Nordau, in approaching the subject, "is filled by the cry of 'Bread for the Masses.' . . . The causes of modern revolutions are not constitutions on paper and democratic party cries, but the longings experienced by so many to toil less and live better." It is not, as he is careful to show, that the majority of the people now living under civilized conditions are absolutely poor. On the contrary, as compared with their forefathers, they are much more comfortably circumstanced. The trouble arises from the undoubted fact that they are relatively poorer, in comparison with the rich of their own epoch, than the tillers of the soil, the hewers of wood and drawers of water, who were their predecessors. This he puts to the discredit of the modern growth of the city and the factory. "This is the point to which all the countries of Western Europe have arrived—countries considered to be the wealthiest and most highly civilized in the world. Their population is divided into a small minority, living in the midst of an aggressive and extreme luxury, and a vast number consisting of persons who can only support life by the hardest exertions, or who, in spite of all their efforts, find it impossible to attain to a normal human existence. . . . Never before were there so many persons entirely without possessions as at the present time." This is the subject, it may be well to observe here, that a Committee of the British House of Commons was recently appointed to inquire into.

It is safe to prophesy, however, that no Parliamentary Committee would ever arrive at the remedy for the evil of "the unemployed" that commends itself to this author. He arrives at it through a discussion of the sources of great wealth, which he finds to be due in almost all cases "to the appropriation of the results of others' labour, not one's own. . . . When the real estate inherited by a certain man increases in value, it is not the result of his own exertions, but of the fact that the number of working men torn from the land and soil is constantly increasing, that all forms of industry are growing in extent, that the cities are becoming more and more populous, that the labour of civilized society is being confined more and more to manufacturing industries, thus causing the price of provisions to rise in the same proportion as the price of manufactured articles is falling—in short, because other men are working, not because the landed proprietor exerts himself. When the speculator amasses millions, it is by the abuse of a superior strength, either of information, sagacity, or of combination, with which he deprives the labouring and saving classes of their property, just as the brigand relieves the wayfarer of his purse, first knocking him down with his club. When the manufacturer becomes a Crœsus, it is by systematic plundering of his workmen, who receive, for their exertions in his behalf, nothing more than food and shelter, like so many domestic animals, and both the scantiest possible. The entire results of their labours flow into the money-bags of their master."

The foregoing picture of the origin of great relative wealth is, of course, exaggerated, probably purposely. Nor is Nordau more complaisant when he turns from the contemplation of the accumulation of wealth to the conditions of manufacturing industry. It is a fine thing for engineers to apply the sources of power in Nature to the use and advantage of man. "But machinery has not proved as yet the saviour, the liberator, and the ally of the workman, as was first hoped, but, on the contrary, has made him its slave," because production is not governed by demand, but by the desire for the employment of capital. So, according to this trenchant critic, manufactures are increased, but men decay. "That which theory has neglected up to the present time, practice will soon set about in earnest—namely, to demonstrate the preposterousness of the definitions and principles of the present science of political economy, invented and maintained by and for capital, and accepted without inquiry by the world."

Yet Nordau will have naught to do with nationalization of industry, nor any other proposal to destroy the natural institution of private property. He holds that the disturbing element in our economic system is the artificially created right of inheritance. "When a man accumulates a fortune, he wishes to bequeath it to his family in such a way that its members will be, if possible, relieved for ever from the necessity of earning their own livelihood. This is contrary to Nature's laws. It is a violent disturbance of the regular arrangement of the world, according to which every living being is compelled to win for himself his place at the great table of Nature, or perish. This disturbance of Nature's regulations is the cause of all the evils of the economic world." This is the sum and substance of the whole matter, according to Nordau; and we cannot do better than leave him here. How he shows that the system of inheritance really defeats its own end, while helping to ruin the industrial world; how he proves by at least plausible argument that his advice to abolish this right is only an extension of the familiar British system of leaseholds; and how he claims that the absorption of all goods into the public property after the death of the accumulator would create an almost inexhaustible public fund, without interfering with individual possession—we have no space to recount. Suffice it that we have helped to circulate a suggestion in regard to the reform of the existing economic system which is quite new, and may serve to arouse reflection in many minds.

A NEW INCANDESCENT GAS-LIGHTING SYSTEM.

There is at present on view at Broad Street Avenue, an installation of a new form of incandescent gas-burner generally described as "Verstraeten's system." The system in question, which is in full commercial operation in Germany and Belgium, presents several novel and promising features, besides repeating in a general way the best results obtained by the familiar Welsbach lamps. In appearance, the Verstraeten lamps are at the first glance hardly distinguishable from the standard Welsbach pattern; but yet there are differences between the two devices which become noticeable upon closer examination of the newer model.

In the first place, the Verstraeten lamp has a chimney divided, at middle height, into two "stories," which enables provision to be made for the suspension of the "mantle" from the brass-work of the divided chimney, instead of (as in the Welsbach) from a vertical central rod. Several advantages are claimed for this alteration of the manner of suspending the mantle. Then the Verstraeten mantle itself differs widely from the prototype. It is carbonized in a closed vessel before being impregnated with the refractory material in solution; and it is claimed that, on this account, the skeleton absorbs more of the solution, and absorbs it better, than if it were soaked while still retaining its organic nature. As sent out to users, these impregnated carbonized mantles are packed flat in boxes; and they will thus endure a fair amount of handling. They are burnt off before being placed in their working position, which operation is much facilitated by the division of the chimney. With regard to the efficiency of the system as applied to gas lighting, we are able to testify, from observation, to the brilliancy, good colour, and silence of the light, and also to the neatness of the whole appliance. It is claimed that an illuminating power of 60 candles is obtained with a consumption of from 75 to 80 litres (about 2¾ cubic feet) of gas per hour; and also that the mantles are very durable, and not likely to break the chimneys, if by chance they should get damaged in use.

An exceedingly interesting modification of the Verstraeten system (also on exhibition here) is its adaptation to portable oil-lamps, which is an entirely new departure in incandescent lighting. For this purpose, at present methylated spirit is found most economical and suitable; but it is confidently expected that any description of mineral spirit or volatilizable oil will eventually be usable with the system. The essential feature of these incandescent oil or spirit lamps is another "two-storied" disposition, in which a small asbestos wick first burns a tiny quantity of the fluid in a position where its heat can be utilized to vaporize a larger supply of spirit; and this vapour is then burnt atmospherically inside a mantle, as with the gas-lamp. The effect is practically the same with the fluid as with the gaseous fuel; and it is easier to admire the ingenuity of the arrangement, and to perceive the vastness of the field thus opened up for the system, than to foreshadow the effect of the discovery.

It will thus be seen that the Verstraeten system is very much more than a mere copy of the Welsbach appliance. The fact remains, however, that the Verstraeten lamps conform to the Welsbach type, just as all successful electric incandescent lamps have conformed to the type established by the genius of Edison and Swan. This conformity is in a sense copying; but it is also something more. The original producer of a typical article may naturally regard all his followers as imitators; and so they are, up to a point. But this is emphatically a connection in which "imitation is the sincerest form of flattery." There is no property, save that of credit, in a type. It will always be counted to Dr. Auer von Welsbach that he equalled Edison and Swan in framing the type of a great improvement upon known systems of artificial lighting; and having endowed the world with this type, the discoverer cannot prevent its repetition, which is a compliment.

There are, however, no compliments in trade; and consequently it is quite possible, and likely, that the present owners of the Welsbach patents, and the other patents that have been added to them, may regard the Verstraeten system as trespassing upon their preserves. How this may be, we know not, But it is stated, on the authority of Mr. W. R. Bousfield, Q.C., that the method by which it is proposed to prepare the mantles (which is a secret) would not infringe the Welsbach patents mentioned by him. It should be observed that there is great activity just now in the Continental trade in incandescent gas-burner systems; and that in all cases the manufacturers of new lamps of the kind prefer to keep their mantle preparations secret, instead of patenting the composition of their dipping solutions. It is not for us to pronounce upon the wisdom or otherwise of this line of conduct; the interest of the gas industry being rather in the production of as many improved lamps as possible, than in the commercial policy of rival inventors and traders.

NOTES.

The Behaviour of Building Bricks under Heat.

In discussing the qualities of building bricks, a writer in the *Builder* observes that comparatively little is known concerning the behaviour of bricks when subjected to intense heat, beyond the fact that, unless made of fire-clay, or other suitable material, they become destroyed in furnaces, and similar situations in a very short time. Reference is made to the result of an experiment to determine the expansion of a tall chimney at Messrs. Cubitt's works. This stack was circular in section, 105 feet high, and the flue was 5 feet in diameter to the top. The brickwork was 14 inches thick at the bottom, and 6 inches thick at the top; the bricks being specially moulded for the structure. It stood in the centre of a small square of buildings, and had stone steps leading to the top; but these did not touch the shaft anywhere. It is remarked that such a structure offered unusually perfect facilities for ascertaining the effect of heat on the brickwork. As a matter of fact, it is recorded that, an index having been set up on the topmost landing of the stone staircase, under cover, it was observed that this length of shaft became $\frac{3}{8}$ inch higher when the fire was lighted than when it was out. This record suggests that gas managers and their assistants have unusually good opportunities for observing and collecting data respecting the movements and other behaviour of masses of brickwork under the influence of heat; and it would be to the advantage of the science of building construction if they were to make use of these opportunities, and publish the results in the technical press.

Glass Sand for Brick Making.

A new use has been suggested for the enormous quantities of broken black bottles which are a concomitant of modern civilization. A correspondent of the *Builder* suggests that, as the material has no market value, it might be found economically feasible to collect and pulverize it for use as builders' sand. The cost of grinding is stated to be very small; and any quantity of black and other glass is to be obtained in London for the carriage. Commenting upon this suggestion, the *Builder* remarks that the idea is not altogether novel, though very little has been done practically in this regard. There is no doubt that ground or crushed glass would be suitable for mortar; being sharp enough to take the place of the sharpest sand. As for the chemical composition of glass, which is principally composed of silica, with lime, soda, and iron in varying proportions, there is very little likelihood of its being able to materially influence the action of the mortar in any way. The only question is that of cost; and it is stated that the chief reason why crushed glass has not been more largely used abroad for mortar making is because it is found to make a good brick for use in chemical works, as the material is almost proof against the action of acids. Our contemporary has often wondered why the Thanet sand and lower greensand of the neighbourhood of London have not been extensively used for the manufacture of fire-bricks, since glass-sand mixed in proper proportions therewith would form an excellent flux. The question is of interest for the large Metropolitan consumers of fire-bricks; and so far as we are aware, it has not been asked before.

A Question of the Ether.

The persistently recurring question of how the ether moves with or through matter has been again attacked by Herr L. Zehnder, who recently contributed an interesting paper on the subject to *Wildemann's Annalen*. He endeavoured to ascertain for himself, by experiment, whether the ether is pushed along by atoms or bodies, or whether it passes through their substance without resistance, or, finally, whether only a portion of the ether adheres to the particles of bodies; and this portion only is carried along. Herr Zehnder's apparatus, which he relied upon to furnish replies to these inquiries, consisted of a cast-iron cylinder, in which an air-tight piston moved. A small tube led out from one end of the cylinder, doubled back upon itself, and returned to the other end. Now if the cylinder was exhausted of air, so as to leave nothing but ether behind, and the piston was then worked, the inference would be that the ether would stream through the small tube with a velocity as much above that of the piston as the ratio of the sectional area of the one to the other. This ratio was 560 to 1; and exhaustion was carried to the 40,000th part of an atmosphere. To ascertain whether the ether moved in the sense contemplated, a beam from a brilliant sodium flame was passed through two thick parallel glass plates; the second one being silvered at the back. This plate, by its two reflecting surfaces, split the beam of light into two, each part travelling through one portion of the small tube. Then the same beams were reflected back upon the thick plate, and returned along the way they had travelled; being finally reflected into the reading telescope by the first plate. Interference fringes were thus produced in the field of view, the motion of which would have indicated a movement of the ether; but no such motion was observed when the tubes were thoroughly exhausted, so that it was concluded that the ether passes through solid bodies. The alternative view, that there was no substance in the apparatus answering to the name of ether, does not appear to have occurred to the experimenter. These experiments supply one more demonstration of the negative character of the physicist's ether.

The Occlusion of Hydrogen by Platinum Black.

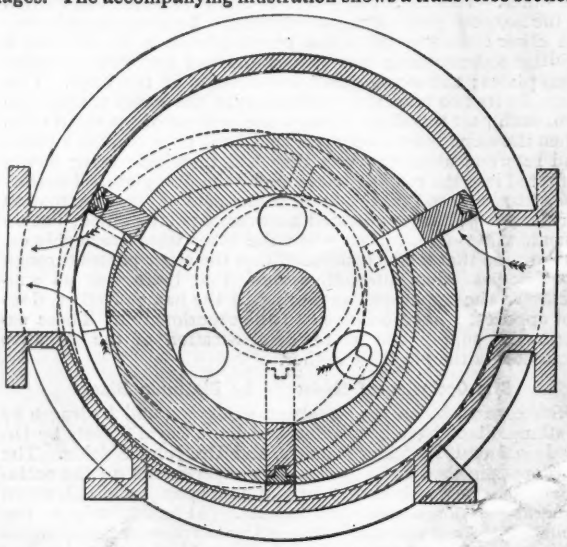
Some remarks on the occlusion of oxygen and hydrogen by platinum black have been submitted to the Royal Society by Dr. Ludwig Mond, Professor Ramsay, and Dr. John Shields. The authors described some preliminary experiments on the occlusion of oxygen and hydrogen by platinum sponge and foil, which generally confirm Graham's results. At most, only a few volumes of these gases are occluded by the more coherent forms of platinum. It is stated that platinum black, when dried at 100° C, retains in general 0·5 per cent. of water; and this can only be removed *in vacuo* at a temperature (400° C.) at which the black no longer exists as such, but is converted at least partially into sponge. At any given temperature, the water retained by platinum black seems to be constant. Platinum black contains about 100 volumes of oxygen. In determining the quantity of hydrogen occluded, the authors have carefully distinguished between the hydrogen which goes to form water with the oxygen always contained in the platinum black, and that which is truly absorbed by the material itself. Altogether about 310 volumes of hydrogen are absorbed per unit volume of platinum black; but of this 200 volumes are converted into water, and only 110 volumes are really occluded by the substance. The quantity of hydrogen absorbed is very largely influenced by slight traces of impurity, probably grease or other matter, which forms a skin over the platinum. Referring to the results of the phenomenon of hydrogen occlusion obtained by Berliner and Berthelot, the authors observe that the heat measured is due for the most part, if not entirely, to the formation of water by the oxygen always contained in platinum black, and declare that it has yet to be proved that the absorption of hydrogen by pure platinum black is attended by the evolution of heat.

Sewer Ventilation.—At the meeting of the British Medical Association last week, Mr. J. Parry Laws, F.I.C., read a paper on this subject. The author, it may be remembered, has made a special study of the bacteriology of sewage, upon which, in conjunction with Dr. F. W. Andrewes, he has reported to the London County Council. In his communication to the above-named Association, he pointed out that, in order to find a thoroughly satisfactory solution to the question of the harmlessness or otherwise of sewer air, our attitude must be influenced by the conclusions at which we ultimately arrive. Although the hypothesis which regarded sewer air as capable of disseminating the morbific germs of disease is, he thought, proved beyond reasonable doubt to be an erroneous one, one must not therefore forget the immense benefits and the saving of life that modern sanitation, mainly influenced by this hypothesis, has brought about. Whatever the ultimate verdict be, whether sewer air is harmless or otherwise, it will always be the imperative duty of those charged with the care of the public health to ensure rapid and efficient removal of all sewage and refuse matter, and, above all, to guard against defective drainage and probable pollution of water supplies. The more light that is thrown upon the dissemination of those diseases which have been, he thought erroneously, associated with sewer air, the more evident does it become that polluted water and milk supplies are among our most insidious foes.

TECHNICAL RECORD.

MESSRS. GWYNNE AND CO.'S NEW PATENT EXHAUSTER.

The exhausters of Messrs. Gwynne and Co. are well and favourably known to gas managers all the world over; the firm having consistently maintained a high standard of material and workmanship in these indispensable adjuncts of carbonizing plant. Hitherto, however, they have been content to reproduce, without fundamental alteration, a very familiar type of machine—the rotary exhauster with an eccentric barrel and double slide, which can be traced directly back to the Beale rotary steam-engine. This year, Mr. J. E. A. Gwynne and Mr. J. Ingham have patented an improvement upon this machine which, while preserving much of the appearance and the essential principle of the type, presents several notable advantages. The accompanying illustration shows a transverse section



of the new patent exhauster, the chief points of which are as follows: By a novel disposition as simple as it is ingenious, the space occupied by the eccentric drum is made available for the work of exhaustion, and the same slides are utilized for the purpose. There are three slides instead of two, as in the ordinary machine, and these are double acting. When they project into the lenticular space between the drum and the interior surface of the exhauster barrel, they sweep gas forward through this space as in the old machine; but when they are retracted into the eccentric barrel itself, they also sweep gas forward through this inner space. Practically, therefore, the new machine is an exhauster within an exhauster—both of the same pattern, acting on the same principle, and by the same moving parts. By an arrangement of the case, gas enters both the exhauster proper and the drum, or inner exhauster; and inasmuch as the latter is exerting its maximum influence upon the gas while the former is passing through its minimum phase, the gauge on the gas-main is kept at a uniform level, which does not depend upon the rate at which the machine revolves. Moreover, owing to segment guides not being required for the triple slides, a chief source of friction in the old machines is abolished. Thus, while the utilization of the space once occupied idly, so far as exhausting effect is concerned, by the eccentric drum, increases the useful effect of the new machine by from 30 to 40 per cent. for the same driving speed, the elimination of a great deal of the friction incidental to the old style of guiding the slides enables the speed to be increased by one-half. This means that about double the exhausting work possible for an old-pattern exhauster can be done by a new machine occupying no more space.

We recently had an opportunity of inspecting the experimental working, at Messrs. Gwynne's establishment in Brooke Street, Holborn, of the first exhauster built on the new system. This was a machine that on the old pattern would have been rated at a pumping capacity of 10,000 cubic feet per hour, driven at a speed of 250 revolutions per minute. It ran up to 340 revolutions per minute easily, without showing the slightest indication of heating; and when, at our request, it was slowed down to 100 revolutions per minute and less, the gauge showed that these variations of speed have no influence upon the pressure. It is indisputable that, in their new pattern exhauster, Messrs. Gwynne and Co. have a speciality likely to commend itself to those gas managers who possess a keen sense of the advantage of a steady gauge in the exhauster-room, and are at the same time anxious to do the work of exhaustion or gas pumping at the smallest possible cost for fuel. Apart from economical and technical considerations, it is interesting to see that in its old age the familiar rotary gas exhauster has been made to submit to a radical improvement that has doubled its usefulness, besides removing a besetting evil. After this, who shall say that the mechanical side of gas engineering has no further surprises in store for the technical world?

DR. THORPE ON GAS ENRICHMENT AND THE FUTURE OF THE GAS INDUSTRY.

At the Annual Meeting of the Society of Chemical Industry, held in Leeds last Wednesday, the PRESIDENT (Dr. T. E. Thorpe, B.Sc., F.R.S.) devoted a portion of his Inaugural Address to the subject of the enrichment of gas as bearing upon the future of the gas industry.

Having alluded to the fact that the extinction of gas making was predicted some years ago, Dr. Thorpe remarked that threatened manufactures, like threatened men, sometimes lived long. So many industries were now dependent upon the gas manufactory, that it was like a town with many staple trades, each of which acted and reacted upon the prosperity and development of others. This very potentiality, indeed, afforded the strongest assurance of its continued existence; and with each fresh economy in production, with each new application as a source of power, with every new discovery in the use to which the countless products of destructive distillation of coal could be put, the industry acquired a new lease of life. The tendency of modern life was more and more to turn night into day, and "Light, more light," was the ever-constant cry.

At the present moment, the question of enrichment was engaging the attention of every gas engineer. This enrichment might be effected by three methods: (1) By causing the gas to take up the vapour of volatile hydrocarbons; (2) by mixing the coal gas with oil gas, obtained by decomposing oils by heat; or (3) by mixing the coal gas with carburetted water gas, made by decomposing oils in heated chambers while subjected to a current of water gas. The idea of carburetting coal gas with volatile hydrocarbon vapour was, of course, not new. Something like forty years ago, the late Dr. Letheby sought to put this idea into practice, but without success. The hydrocarbons he employed were four, uniform in character, of very different degrees of volatility, and of varying illuminating value; so that after the gas had passed through or over the enricher for some time, the more volatile portions having been evaporated, the residual hydrocarbon was more likely to decrease than increase the illuminating value of the gas. In the Maxim-Clark process, this difficulty was obviated by using a light spirit of fairly uniform composition, which was volatilized into the gas as required; and there was little doubt that, if benzol continued at its present price, it would constitute the best and cheapest enricher that could be obtained.

The fall in the price of oils, which took place a few years ago, naturally gave an impetus to the manufacture of oil gas, and to its utilization for the purpose of enrichment. Enrichment by oil gas had been largely adopted in Scotland and many English works; and most gas managers who had given the process a fair trial had abandoned the idea of returning to cannel, as oil gas was not only far cheaper, but it was more easily worked, and the illuminating value of the gas as sent out was more under control.

A serious drawback to the employment of carburetted water gas was that it contained 30 per cent. of carbon monoxide; and though the Board of Trade had not yet taken any steps to limit the amount of carburetted water gas that might be mixed with coal gas for distribution, there could be no question that its use was attended with great risk. To anyone acquainted with the poisonous action of carbon monoxide, the distribution of so deadly an agent into our houses would be viewed with serious apprehension. If the public mind once realized this danger, the gas industry might suffer a blow from which, with the electric light on its flank, it would not readily recover.

Wöhler's discovery of the carbides of the alkaline earths, and the mode of their decomposition by water, after lying dormant for many years, seemed about to bear fruit. One had in calcium carbide, which was now being produced on a relatively large scale by means of the electric furnace, a ready means of producing large quantities of acetylene of a high degree of purity. This substance could be made to burn, under proper conditions, so as to produce a flame of extraordinary luminiferous value and character. It remained to be seen what practical application could be made of this fact. Unfortunately, acetylene was hardly less dangerous to breathe than carbon monoxide. Should either of these gases ever come into general use in connection with gas lighting, some more stringent tests as to the character of the gas-fittings and mode of distribution would have to be insisted upon, or the public health would suffer.

In connection with the subject of destructive distillation, the President alluded to the great improvements made in the construction of continuous stills for the production of sulphate of ammonia. Although tar had many virtues, tar-works, he said, were not usually regarded with very much favour by those who happened to live near them. Hence the Lennard process,* which obviated the nuisance incident to intermittent work, would, no doubt, be warmly welcomed by the sanitary authorities. Having next referred to various chemical processes,

* See JOURNAL, Vol. LXIV., p. 604.

Dr. Thorpe concluded this portion of his address by remarking that, in view of the repeated warnings that in the chemical industries we were falling behind our continental competitors, it was satisfactory to note that, in at least one important manufacture, we were more than able to hold our own.

HYDRAULIC STOKING MACHINERY AND LABOUR-SAVING APPLIANCES IN MODERN GAS-WORKS.

By A. S. Biggart, of Glasgow.

[A Paper read before the Institution of Mechanical Engineers, July 31.]

The conditions of labour in almost all industries have undergone, and are constantly undergoing, continuous modification and improvement, due principally to the ever-increasing uses to which mechanical appliances are being adapted. This statement may be aptly made of many of the modern gas-works; for in no industry have the conditions of work been more radically altered. The bulk of the labour employed in gas-works is absorbed in the retort-house, in the handling of the coal previous to and after carbonization.

In works where hand labour is chiefly employed, according to the old methods which still retain sway in the great majority of instances, the following may be taken as representing the general routine of those having the most approved arrangements. The supply of coal is usually brought by rail to the position most convenient for the retort-benches, where the waggons are emptied by hand. If necessary, as is generally the case, the lumps are broken into suitable size by hand. The retorts are next charged by hand labour; and after carbonization is completed, the coke is withdrawn, also by hand. The coke is either wheeled out to the yard, or may fall below the floor to a lower level, to be there quenched by water. The surplus beyond what is required for firing, has then to be removed to the yard. In the yard, hand labour is again called into requisition, to screen the coke, and fill it into the carts or waggons, for distributing it to the consumers. The variations in the details of the handling are such that scarcely two works follow the same routine; and the foregoing outline can therefore be taken only as generally representative.

The same remark also applies to the following outline of the routine pursued in works where labour-saving appliances are largely used. The supply of coal in such modernized works is usually delivered direct from the railway truck into the coal-breaker. After passing through this machine, and being all reduced to a proper size, it is raised by an elevator to a large hopper, so fixed that the coal can be automatically delivered into the hopper of any of the charging-machines. The charging of the retorts is then done altogether mechanically, by means of a hydraulic charging-machine, by which it is done more evenly and otherwise better than by hand. After carbonization, the coke is withdrawn again mechanically by a hydraulic drawing-machine, entailing a minimum of labour to the attendant. The surplus coke, guided in its descent by shoots, falls into a bogie underneath the floor, and is run out to the yard. In some instances, beneath the stage-floor are placed conveyors, on which the coke is carried to circular revolving screens, whence it is delivered into large storage-hoppers, or into the railway waggons, or into bags for small consumers.

The old methods involve continuous and repeated operations performed by hand; while the new are such that no hand labour is employed in dealing with the coal, from the time it leaves the railway truck till it arrives there again in the form of coke. Thus hand labour is entirely superseded by mechanical power, to the great advantage of the labourer and employer alike. The number of men required in the retort-house under the new system is not half that needed under the old method. The saving which this represents, after allowing for maintenance of plant and interest on additional capital, will average about 1s. per ton. As the quantity of coal which might be carbonized annually in this country under the improved system will amount roughly to about 8,000,000 tons, the saving to the gas consumers would be about £400,000 per annum, if stoking machinery were fully adopted. Stoking machinery is not of recent date, though successful plant for such work has been used only a comparatively short time. For the successful working of the stoking-machines, considerable auxiliary machinery is necessary.

The coal-breaker into which the coal is delivered direct from the trucks by shoot or otherwise, varies greatly in strength, according to the different classes of coal; but the principle of the machine is in nearly all cases the same. Fixed over the breaker is a hopper, which is kept filled with coal, thus maintaining always a supply of coal directly in contact with the two top rolls, each of which has a series of claws shaped in cast steel, and working into one another, thus drawing in and breaking the coal in its passage through the rolls. Here it is only partially broken; but it falls directly upon two other rolls, which break to suitable dimensions any remaining larger pieces. These lower rolls are set closer to each other than the upper pair; and their crushing-teeth are much smaller, and of a different form. The coal delivered from these lower rolls is raised by an elevator to the large storage-hopper, from which the various charging-machines draw their supplies. The breakers are necessarily of a strong design. The cheeks and gearing are of steel throughout; and in all other respects, the machines are made equal to the exceptionally heavy work required of them. The elevators are of the usual kind, raising the coal in buckets fixed at short intervals on a travelling link chain, which passes round two revolving wheels—one fixed at the top, and the other at the bottom of the steel framing that carries the whole. In passing round the lower wheel, the buckets dip into the coal to be raised; and in turning over the upper wheel, they tip it into a shoot leading to the storage-hopper.

Each charging-machine has to serve a large number of retorts at varying heights, and also at varying distances from one another. Consequently, the range—that is, extent of retort-bench surface requiring to be effectively served by the charging-machine—is considerable. The horizontal range is obtained by laying rails parallel to the retort-bench, along which the charging-machine may travel. The vertical range is secured by raising and lowering the charging or drawing apparatus on the machine, by means of a hydraulic ram, which is fixed to the machine itself. In addition, therefore, to the coal regulating and charging apparatus, the body of the charging-machine has to be provided with gear for traversing and raising and lowering; while on the top of the framing, at a sufficient height, a large hopper is permanently fixed, capable of carrying from 2 to 5 tons of coal, or a still larger quantity if desired. The regulating gear, for delivering from the hopper in greater or less quantities the coal with which the retorts are to be charged, is securely fixed immediately underneath the hopper.

The whole of the motions are automatic, and are regulated by a single lever. The first step is to drop from the hopper, by means of the coal-regulating apparatus, a certain quantity of coal in front of a pusher-plate, by which it is then pushed into the retort, and delivered by a series of six or seven pushes into successive positions—beginning from the far end, and extending forwards through the whole length of the retort. These positions are so close to one another, and the form of the pusher-plate is such, that the charge is left practically level throughout the retort. The apparatus for accomplishing this work consists of a horizontal slide-beam, on which are placed two hydraulic rams—one for giving the forward movement to the pusher-plate, and the other for drawing it back. Alongside the forward or pushing ram is a turning shaft, carrying a series of stoppers, which come into play in rotation as the shaft is revolved, and bring the pusher-plate to a stand in the successive positions of its stroke, so as to spread the coal evenly over the whole length of the retort. When the drawing-ram bringing the pusher-plate back is near the end of its stroke, it actuates the lever of a hydraulic valve, which, in opening and closing, puts in motion and also stops the coal feeding and regulating supply. This gear consists of a divided drum, revolving underneath the coal-hopper, and put in motion at regular intervals by means of a combined hydraulic ram and rack, with wheel and rachet gear, worked as already mentioned. The hand-lever regulating the pushing and drawing rams serves also to lower the pusher into position when entering the retort, to raise it before returning, and also to revolve the stopper shaft for spreading the charge in the retort. The usefulness of the charging-machine is enhanced by the provision of various adjustments—such as means to vary the quantity of coal in a charge. This is effected by altering the length of stroke of the co-regulating ram, thereby giving a greater or less movement to the revolving coal-feeding drum. A larger or a smaller quantity of coal can also be placed at any particular part of a retort, if this should be desired owing to the temperature of the retort varying at different points.

This charging-machine has now been in regular use for over two years, and is giving every satisfaction. Like all such work, it has reached its present advanced state of efficiency only by a process of development. The first charging-machine made of this kind was an experimental one; and while the main features have throughout varied little from the original design, the details have been considerably altered. In the experimental machine, the coal-hopper was attached to the charging apparatus, rendering it essential, when any change of height was required, to raise and lower the hopper and its contents. In all subsequent machines, this position was discarded, with the exception of one machine specially so fitted, which is still doing good work. The alteration was found desirable, owing to the limit practically put on the coal capacity of the hopper, and also on account of the loss of time in raising and lowering the extra load. It was further found that the new plan gave a more compact design than the old. The coal-feeding drum was at first rotated by causing the back end of the pusher-rod, when near the outer end of its stroke, to strike and carry with it a connecting-rod attached to a lever with pawl and ratchet combination on the drum-shaft. Owing to the sudden blow, however, this did not work satisfactorily. A single-acting hydraulic ram then took the place of the connecting-rod, with a spring opposite the ram to force it back; the ram being worked by a valve with a lever, as at present. Although this alteration proved a great improvement, it was found desirable to replace the spring by a second hydraulic ram, as now adopted; and this change was followed with the best results.

In the experimental machine, only fairly large pieces of coal were at first dealt with; and with these no trouble at all was

experienced. As small coal, however, is extensively used in some gas-works, a trial was made of it, with the result that, when once the coal began to run between the drum and the face-plate opposite, it sometimes did not cease running until the hopper was empty. As the opening could not be reduced without the risk of large coal jamming, and as each machine ought to be suitable for large and small coal alike, it was found essential to adopt some arrangement capable of dealing with all sizes. The difficulty was simply and effectually solved, by fixing in the coal-space in front of the drum a swing plate, having a lever and weight so attached as to cause it to press the coal against the face of the drum, and thus automatically to close, by a sort of flap or clack valve, the space through which the small coal formerly ran freely. The revolution of the drum moves back the flap-valve without difficulty, and allows the coal to flow freely when charging.

Another point, for which it was not at first thought necessary to make any special provision, was the momentum of the coal-feeding drum when in motion. The amount of travel or rotation of the drum after the hydraulic ram had come to a stand, was found to vary greatly. This was owing to the vanes in the drum being often in a different position in relation to the clack-plate at the moment when the hydraulic ram ceased to exert its power. The evil effects were reduced to a minimum, and rendered unimportant, by simply fixing a continuously acting brake-wheel and brake on the end of the drum-shaft.

A machine of this kind is naturally subject to a considerable amount of vibration and shock when in use; and especially is this so with the class of labour usually employed. For various reasons, the former stokers are put to work these machines, which consequently have frequently to stand an amount of rough usage not usually associated with hydraulic machinery. Various minor matters revealed this usage. One was the effect on the copper tubes. More than the usual number gave way at the couplings, although the tubes themselves were of ample strength; the working pressure being only 400 lbs. per square inch, while they were strong enough to stand a working pressure of 1000 lbs. It was therefore found desirable to alter the form of joint, and at the same time still further to increase the strength. The change consisted in simply putting in heavier copper tubes, and, instead of screwing the collars on at the ends of the tubes, in flanging the copper over, and soldering the collar behind the flange. Other minor details have also been improved; and modifications will no doubt continue to be made as the experience of actual working is gained.

About a year ago, it was thought desirable, with a view to increasing the capacity of the coal-hopper on the machine, to introduce mechanical power for traversing it along the floor, and a hydraulic motor was designed and made for this purpose. Hydraulic power, being already used in the machine, was naturally deemed the most suitable means to adopt—more especially as the load to be moved is a fairly constant one. It was decided to employ two hydraulic rams, with racks working in the opposite sides of a spur-wheel, which is free to rotate backwards and forwards. On this wheel are secured two pawls, each working in a spur-wheel alongside the first wheel. As the first wheel moves in one direction, the pawl in gear on one of the side wheels goes with it; and on the motion of the first wheel being reversed, the second pawl takes the other side wheel in the opposite direction. Each of the side wheels revolves a separate mitre wheel; and as the two mitre wheels are geared into the opposite sides of a common mitre wheel, the latter will revolve continuously in one direction. This common mitre wheel is keyed on a shaft that is geared with the main axle of the machine, through which it traverses the charger backwards or forwards as desired. To reverse the motion of the common mitre wheel, it is only necessary to reverse the action of the two pawls gearing into the side wheels. The hydraulic rams receive their water through a three-ported slide-valve, which is made to reverse by a secondary key-valve. The latter is controlled by a double lever, which is actuated by the two hydraulic rams themselves as they approach the outer end of their stroke. A simple arrangement of lever-gear has been adopted for reversing the pawls; so that, by moving a hand-lever, the action of the hydraulic motor sends the charging-machine in either direction at the will of the attendant. In order that the charging-machine may be more completely under control while travelling, a brake has been added to the motor; so that, when the machine is nearing the stopping point, the water is cut off, and the brake brought into action.

While the charging-machine is employed in filling the retorts with coal, the drawing-machine is for the reverse operation of withdrawing the charge from the retorts after it has been converted into coke. For this purpose, a rod having a plate fixed at its end is used, similar to that which pushes the coal into the retort in charging. But for withdrawing the coke, the plate can be held in either a vertical or a horizontal position. It is held horizontal while the rod is being inserted into the retort above and clear of the coke to the distance desired; and it is then lowered into the vertical position, so as to cut into the coke, and drawn forwards, bringing in front of it part of the carbonized charge.

The action of the drawing-machine is so similar to that of the charger, that there is considerable similarity in some of the parts. The arrangements for travelling the machine along in front of the retort-bench, and for raising and lowering the slide-beam which carries the withdrawing-rake, are in principle similar to the equivalent arrangements in the charger, though differing in detail. The drawing-machine is so light in itself that it is unnecessary to apply mechanical power for traversing it backwards and forwards, as is done in the case of the charger. The drawer consists essentially of a carriage fitted with travelling gear, and having a bow frame fixed near the centre, which carries the slide-beam, with its pushing and drawing rams and connections for actuating the rake. This bow also carries the hydraulic ram for raising and lowering the slide-beam as required. The rake is pushed into the retort and drawn out again by simply reversing a hand-lever, the motion of which not only reverses the valve, but also raises the point of the rake-head at the beginning of its stroke, and lowers it at the end of the stroke. The rake is raised as it enters the retort, and passes over the coke. It is depressed again before beginning the return stroke, thus dipping into the coke, and raking it out at every draw.

The number of retorts charged or drawn per hour by these machines varies to a considerable extent in actual work. In some cases, owing to special circumstances, not more than 24 per hour are available for each machine; while in other more favourable instances, as many as 48 per hour are allotted to each, and even with this larger number a reasonable time remains for rest for the stokers at the end of each hour. The labour of charging the retorts and withdrawing the coke is much lightened by these mechanical means; and the number of retorts charged and drawn for each stoker employed is largely increased. It might at first be imagined that coal placed in retorts in only six to eight large charges by the machine would not be so evenly laid as a much larger number of smaller charges put in by hand. The machine, however, lays the coal by far the most evenly, owing partly to the shape of the pusher-head, which is bevelled so as to allow the small ridge of coal raised in pushing forwards to fall back when its support is removed on the withdrawal of the pusher-head. Another advantage possessed by machine work over hand labour is that the charging is done more quickly; and thus there is a diminished loss of gas before the retorts are sealed up.

Apart from any other consideration, the mechanical charger could not fail to prove beneficial in view of the greatly improved conditions under which it enables work of a most trying nature to be carried on. The old method of hand-charging was a severe ordeal for the stokers, requiring great exertion to get through the work in the shortest time possible, while exposed throughout to a high heat. Such adverse conditions are now entirely done away with where mechanical stoking obtains. The single lever by which the whole of the operations are controlled, is worked from such a position that the attendant is quite removed from the discomfort of close proximity to a high heat; while, at the same time, the former severe bodily exertion is replaced by light and easy work. Even greater improvements in the conditions of labour arise from the introduction of the drawer, which accomplishes, under all the better conditions attending the use of the charger, work of a still more trying nature. The withdrawing of the live coke from the retorts was work for which even the stokers themselves, accustomed as they were to it, admitted that mechanical appliances were required. Here, again, all is worked by a single lever, in such a position as to remove the attendant from the former discomforts of withdrawing the coke at a white heat at the mouth of the open retort.

In conclusion, the author said that the hydraulic power employed, at the pressure usually of about 400 lbs. per square inch, is distributed in the way generally adopted for similar installations. He showed, by means of drawings, various typical methods of handling the coal and coke; and he remarked that, about two hundred of these machines are now in use, or in course of manufacture. They have been adopted at many of the largest gas-works in this country and abroad—including those of Glasgow, Birmingham, and Liverpool, the South Metropolitan and The Gaslight and Coke Companies in London, and the Vienna and Amsterdam stations of the Imperial Continental Gas Association. In Glasgow, where the Corporation have adopted the machines for all their stations, the quantity of coal dealt with by them amounts to about 500,000 tons per annum.

In the course of the discussion on the paper,

Mr. W. Foulis testified to the satisfactory way in which the machines worked. He said they ran night and day without giving the slightest trouble; and their introduction had effected a great saving of money.

Mr. Flett said there was no doubt that mechanical retort stoking was much better than hand labour; for under the former system there was no difficulty in levelling up the various successive charges, so as not to leave spaces in the body of the coal in the retort. He believed the adoption of this machinery would in time become general.

Mr. J. West said he agreed with all that had been said as to the great benefit arising from the adoption of machinery in place of hand labour. He was anxious that some facts and figures should have been given as to the advantage to be derived in regard to the question of cost; but as this had recently been done by the President of the North British Association of Gas Managers (Mr. Alex. Wilson),* he supposed Mr. Biggart did not think it was necessary. He also remarked that while the author of the paper said that stoking machinery had been in operation

* See *ante*, p. 228.

only a short time, it was actually in use twenty years ago. He (Mr. West) believed he had done more than anyone else in the invention of machinery for this purpose; and at Manchester, coal-breaking and elevating machinery had been in use since 1875. He was pleased to see that machinery had now been introduced in Glasgow. Reference had been made to the amount of manual labour required in charging and discharging retorts; and it was said that this gave an idea of the pressure that would be required. He had found that nearly all inventors had started out with making the machines too light; and as they proceeded they had to strengthen and increase the size of the various parts of the machinery.

Mr. J. HEAD remarked that the ingenuity displayed in the charging and discharging of retorts had been very much the effect of the labour troubles of some two or three years ago. This showed the tendency of these difficulties. Instead of contributing a greater amount for labour, which was the object of these difficulties from the workmen's side, they generally ended in machinery that cost less for labour, to the general benefit of the community. They were much obliged to Mr. Biggart, Mr. Foulis, and others, who had managed to make such a very complete and effective plant. He would like to know whether Mr. Biggart had turned his attention to the substitution of electricity for hydraulic power in this kind of machinery. It seemed to him that this machinery had a resemblance to an overhead travelling crane; and in America electricity had in these cases very much taken the place of other mechanical appliances.

Mr. BIGGART, in reply to the discussion, said that elevators and similar labour-saving machinery had been long in use in the country meal-mills; and the principle of the elevators now in use in gas-works was the same, only the details were altered to suit the new kind of work. With regard to electric power, this was a matter that had received attention. But the objection to such power was that they would require to introduce revolving machinery and shafts. After the members had passed through some of the business premises where electric power had been introduced, they would come to the conclusion that, of all kinds of machinery that should be adopted in retort-houses, revolving machinery should be avoided. In the hydraulic machines, the principle had been recognized that the moving parts should be reduced to a minimum; whereas with either air or electric motors, there were an immense number of moving parts, and the cost of wear and tear was very high.

The PRESIDENT (Professor Kennedy), in moving a vote of thanks to Mr. Biggart for his paper, said he saw these machines some years ago, when they were in an early stage. He was very much struck with them then; and he had no doubt that in their latest form they would be still more interesting.

The vote of thanks was cordially passed.

THE STANDARDIZING OF METER UNIONS.

By J. NAPIER MYERS, of Saltcoats.

[A Paper read before the North British Association of Gas Managers, July 25, 1895.]

Addison, the prince of English essayists, who died many years before the birth of William Murdoch, the Ayrshire millwright who invented gas for lighting purposes, was no doubt correct in his observation that there is nothing so variable in nature as a lady's head-dress. But the milliners of his day have been out-distanced in the art of dissimilarity by the makers of gas-works apparatus, as there is nothing, I believe, either in nature, art, or manufactures, possessing such absence of sameness; while it will be readily granted that there is no branch of engineering which lends itself so fully to concerted uniformity. I could have wished that this subject, simple as it is, had been placed before you by one of our *solar* men—the men who draw after them their own firmament of planets. In the North, South, East, and West districts of Scotland, it is known that *solar* men exist in the gas profession, with their attendant moons or reflected lights; but it is quite a mystery to me that these "men of light" have not been "men of leading," like the master-spirits in other branches of the engineering trade, who formulated and advocated the adoption of uniformity in all departments of manufacture.

The industry with which we are connected is old enough to have celebrated a centenary, yet the gas engineers have not made any combined attempt to adopt a uniform standard size of the different appliances which form the plant for gas making. It is not very creditable to our profession that we have not yet settled the most suitable sizes for the various form of retorts, or the shape of mouthpieces. Were this done, makers would be warranted in making for stock, and this would affect prices at least 10 per cent. in favour of buyers. It is not, however, to the diversities of gas-works appliances as a whole that I wish, at this time, to call your attention, but to the diverse unions in use among meter makers, who, in the variety they have put in force, are "sinners above all men."

It fell to my lot for some years to manage the works of a gas company where the meter unions were all of the London pattern, and interchangeable; and at present I control a works where my predecessors bought meters from nearly all the different makers, as their fancy prompted—the result being endless variety of meter unions. My experience of uniformity and dissimilarity of meter unions has forced on my notice the evils that attend varieties in meter connections. In the former case, where the meters were nearly all made at the same place, it facilitated the exchange of meters, and was a contributing cause of the unaccounted-for gas being under 5 per cent. This evil is, no doubt, felt most by those who, like myself, manage small or village gas-works; where the work of surveying, testing, and changing meters falls upon the manager. We have at Saltcoats 1500 meters, and I find that about a dozen, or 1 per cent., at each survey require to be shifted; and as the unions are not interchangeable, we require, in most cases, to employ the services of a plumber, which means an expense of not less than 2s. per meter for small sizes. If the unions were all made to standard patterns, the work of exchanging a meter could be done by an ordinary unskilled labourer or handy man on the works. If this work were easier of compass, we should be encouraged to do as we ought to do—*i.e.*, test 10 per cent. of our meters per annum; and this, in most cases, would reduce the percentage of unaccounted-for gas.

The meters made in Edinburgh, besides their other excellences, excel in the variety of their unions. I have here the unions of the 2-light size of meters of six different makers; and they vary in the outside diameter of the screws from $\frac{31}{32}$ inch to $\frac{55}{64}$ inch. Only two of them are alike; and even these are not interchangeable, by reason of a difference in the linings. In casting about in my mind as to whose sizes of unions I should recommend, I have come to the conclusion that Whitworth's standard for gas-tube screws would be the best for meter unions, as set out in the following table:—

For 1 and	2 light meters,	same as	$\frac{1}{2}$-inch	gas-tube,	14	threads	per	inch.
3 and 5	"	"	$\frac{3}{4}$	"	"	14	"	"
10 and 15	"	"	1	"	"	11	"	"
20 and 30	"	"	$1\frac{1}{4}$	"	"	11	"	"
50	"	"	$1\frac{1}{2}$	"	"	11	"	"
60	"	"	$1\frac{3}{4}$	"	"	11	"	"
80 and 100	"	"	2	"	"	11	"	"

I would recommend that the nose of the linings should be of uniform size, and tapered; and with a little grease in the boss, a joint could be made without the aid of tools or washers. The caps should be made a little deeper than is usual, and this would admit of slight variations in the diameters of the boss and linings that would doubtless occur in practice.

My experience with meters above 100-light capacity is too limited to warrant me dogmatizing about the connections for large sizes. But I think for meters above 100-light size, the connections should be made by flanges screwed for iron tube; and these should have a fillet or nose for a washer, and be secured by bolts on the side of the meter. For wet meters, the plugs and caps for watering should be Whitworth's standard size and pitch for bolts.

I have enumerated the sizes, and some of my neighbours in Ayrshire will join with me and support meter makers who are willing to aid us in this reform. But before proceeding further, we wish the *imprimatur* of this Association to our proposals. In this list of screws recommended for meter unions, there are only two pitches of thread; and with only three patterns of unions, you would cover nearly all necessary domestic supplies of gas. I sent copies of my proposals to a number of managers known to me personally, and to other gas engineers known all over the world as pioneers of improvements; and I received replies from these gentlemen, some of whom manage our largest gas-works. Several made suggestions which I have embodied in my remarks; most of them agreed that Whitworth's standard for screws should be adopted; and all were unanimous as to the desirableness of having interchangeability of parts and practical accuracy of fit for all sizes of meter unions. The objections offered by one or two to adopting a new standard are that in some instances it would be out of line with the old screws; and that it would not be a present benefit. Some of those with whom I have corresponded have not experienced our difficulties, because, they say, "for many years we have bought all our meters from one maker," or "we have our standard patterns, and all makers must make to our gauges."

It is far from my intention to add to the confusion by advocating another standard; but I want this Association to stir up the Standards Department of the Board of Trade to legalize these proposals as the common standards; and then all other patterns would be special. The progress made in artificial illumination during the last fifteen years has disturbed the "rest and be thankful" attitude of the gas industry; and great improvements have been effected in all departments. But during this time no improvement has been made in the mode of measuring gas. The prepayment attachment is a change; but it is a questionable improvement, as it doubles the cost of the spoon without giving any more broth for the penny. If the gas-meter trade could come to a common understanding in this little matter of detail, the reform would soon be effected; but conflicting trade interests and jealousies block the way. If this Association will examine these proposals, and recommend them to the Standards Department, it will do much towards clearing the way not only for uniformity of meter connections, but contribute largely to the principle of uniformity in all other parts of gas-works apparatus. If the Board of Trade approved of the proposals, they could be legalized by an Order in Council, and makers of meters would be instructed to make standard Board

of Trade unions after a date to be fixed, except where buyers expressly ordered special unions.

In every branch of civil and mechanical engineering, progress in the simplification of production has naturally been indicated by a diminution in the number of parts or varieties used; and whatever helps to reduce complication, lessen the number of parts, or unify the sizes heretofore considered necessary, attains the highest kind of merit claimed for philosophy by its earliest as well as by its latest representatives. It is from this point of view that an Adam Smith or a Lord Kelvin looks at and counts up the results of the progress in science, art, or manufactures. Judged from that standpoint, it must be admitted that improvements tending to uniformity of standard in the manufacture of gas-works accessories, and more especially in meter unions, have not kept abreast of the progress in simplification attained by cognate industries; and I appeal to gas engineers to combine in an effort to get these suggestions adopted and enacted, and thereby redeem our profession from that reproach.

Discussion.

Mr. J. Hepworth (Edinburgh) said he had listened with much pleasure to Mr. Myers's paper. It had, however, not convinced him that uniformity was desirable; because he had, for very good reasons, he thought, advocated uniformity for a very long time, and he believed that most of the managers of gas-works who had had the experience he had had would welcome such a result as Mr. Myers aimed at in his paper. He (Mr. Hepworth) did not see any serious objection to its being accomplished. They were very slow to move, he supposed, in this country; but he was not aware, naturally, whether the matter had ever been brought before the meter makers, as a whole. He thought, however, that it was brought before the Standards Department of the Board of Trade, some seven or eight years ago; but the result of this action he was afraid he never knew—at all events, he did not remember at the moment what it was. He quite concurred in the suggestions made by Mr. Myers, that it might very well go before the department again. He thought that if the Association could confer with other institutions of a similar character, representing the whole of the gas industry of the United Kingdom, they would very soon arrive at some modest statement which could be laid before the Standards Department on the subject; and, at all events, so far as the meter makers were concerned, he did not himself see any reason why they should not fall into line in the way which Mr. Myers suggested, and with advantage to everyone concerned.

Mr. A. Bell, sen. (Dalkeith), concurred very much with Mr. Myers. He thought the question was a very practical one. As a small manager, he had suffered very much, and did still suffer, from this want of uniformity. He remembered the time before the tube standard was fixed. In those days, the Scotch tubes had a very much coarser pitch than the English; and when so many tubes were used in oil-works, it was extraordinary how much stock was required to be kept. A man had often to go to store for a very trifling matter. This state of things had been cured simply by the representation of the users of tubes. It was the Whitworth pitch all through for tubes now; and he did not believe the Scotch thread was employed, except in such works as were fitted up to begin with under the old standard. Mr. Myers mentioned that he thought it was trade exigencies that kept them from being uniform with meters. He (Mr. Bell) did not see why this should be; and it could not have much weight, because the meter makers were now pretty much a ring. They were combined in many ways—with regard to the price of meters, the allowance for old meters, and such like; and why should they not agree upon this other little point, and make their unions uniform? He did not think there would be much objection to it being done. Of course, they could easily understand that if one meter maker had a little out-of-the-way pitch, he might think that customers would buy his meters again; but he did not believe that would have very much weight now. He thought if this and other Associations were to put it before them, as Mr. Hepworth said, their representation would have very much weight.

Mr. T. Douglas Hall (Montrose) thought, if he remembered aright, the subject of the paper was brought before the Association many years ago; and the matter was handed over to the meter makers, to try to get them to come to some arrangement as to having the unions made uniform. He thought, with Mr. Hepworth, that they, as an Association, ought to combine with other Associations to make some representation to the Board of Trade, and try to get the matter fixed. There was no doubt it was a point which pressed very heavily upon the managers of small works. Managers of such works knew that if anything went wrong with a consumer's meter, the first question asked was, "Have you got a meter in stock that will couple?" Why should they have to put such a question? The next question was: "Who is the maker of the meter?" (which was again wrong); and they had to look up their stock to see if they had another meter of the same make and size. In a small works, again, where they did not have a gas-fitter, they had to employ an outsider, or make a temporary connection until a meter of the proper size could be ordered. He thought the managers of small works felt that the subject was worth looking into; and they were very much indebted to Mr. Myers for bringing it before the meeting.

Mr. D. Macfie (Edinburgh) said he had not felt disposed to take any part in the discussion, for one or two reasons. Among others, the subject admitted of only one side; there could be no answer to Mr. Myers's indictment of the variety of meter unions. But when he asked who was responsible, it was difficult to find that out. He (Mr. Macfie) supposed that, if they went far enough back, they would find out that the millwrights each had his own thread and his own screw; so that if a mill required repairs, he must be employed. That, of course, had been all put aside; and the man who would continue to make his own screw, with regard to any of the ordinary mechanical appliances, stood a very small chance of getting orders. It might be different with meter makers; but sometimes he thought the question could be very easily settled. He did not think it should be necessary to call in the aid of the Board of Trade; he believed that the mere hint of this or any other Association, would be concurred in by the meter makers. Looking at Mr. Myers's suggestion, it seemed to him to be a very reasonable one. He would not—no one would—like to commit himself to the sizes named in the paper, at first sight; but undoubtedly the proposal as to the thread to be used seemed a very reasonable one. With regard to the sizes, he did not know that he could say anything as to modifying them, except with regard to the three-light size. This might be made a $\frac{5}{8}$-inch instead of a $\frac{3}{4}$-inch standard. But, altogether, it seemed to him that the list which had been produced looked, upon the face of it, a very reasonable one, and might be very easily adopted, if a representation were made in the proper quarter, without going to the Board of Trade.

Mr. A. Yuill (Alloa) said that, as the matter was rather a subject for the meter makers than for them, as gas managers, it would go more from them as a recommendation to the meter makers; and seeing they had got the expressed opinions of the representatives of meter makers there, he did not think that much difficulty would be experienced in considering the matter. But he thought that, seeing the Association had a Research Committee, it was a subject which could be very fairly put before them; and the Research Committee could confer with the meter makers, and see if they could arrive at something like uniformity. He would propose that the matter be remitted to the Research Committee to consider.

Mr. J. Ballantyne (Rothesay) said there was just one other matter he would like to call attention to, more by way of suggestion than anything else. It was this: Supposing they had the unions made upon the forms suggested, unless the meters were exactly the same size, or very near it, the unions would not be of very much use, without the aid of a gas-fitter. If they had a meter fixed in a given situation, and the pipes for the meter were exactly on a level to fit it, and if they took away the meter and substituted one which, although it had the "universal union," if the pipes were 2 or 3 inches shorter, the whole thing would be useless. It seemed to him therefore that it should be suggested that the meters should be made as near as possible of the same height; if they were made of the same height, he could see the benefit. He had often wondered how landlords did not object to the way they cut their pipes. They knew that if a pipe were found to be too short, the plumber simply soldered a piece on; and if, again, a meter were set up which required a shorter pipe, he cut so much out. The cutting and lengthening went on from time to time. Gas-fitters, again, were not very particular. They would try to force the half of one coupling to fit the other; and the consequence was that the threads were often stripped, and the meter was practically destroyed. They were very much indebted to Mr. Myers for bringing his paper before them; but he thought the other matter should also be attended to—to have meters of the same light made of a uniform height.

Mr. J. Renfrew (Langbank) suggested that, in approaching the meter makers through the Research Committee, it might answer their purpose quite as well to give it forth, from the Association, to the meter makers, that only makers who adopted the standard sizes of unions would have their meters taken up by the members.

Mr. D. M. Nelson (Glasgow) endorsed what had fallen from Mr. Yuill with reference to the suggestion that the matter was one for the Research Committee. A recommendation would come better from them, perhaps, than from any other body. He remembered that, many years ago, a similar difficulty arose in relation to wrought-iron tubes. There was the Scotch pitch, as it was called, and the Whitworth pitch; and he remembered they had to adopt the principle of making both pitches, and by-and-bye this became a very troublesome thing in practice. But there was a sort of moral suasion which operated in the matter; and they did not have to apply to the Board of Trade. He thought the same moral suasion would apply here; and that the meter makers would quietly adopt the pitch that was most "in line." By-and-bye the others would become obsolete. At the same time, he thought it should go through an authoritative body, such as the Research Committee.

The President said he would just like to point out that, of course, a certain amount of loss would be entailed upon the meter makers in effecting the alteration. At the same time, the gas companies would have to bear their share of the loss. In fact, the loss would be pretty well divided; and in this way they were not asking too much. He thought that the point which Mr. Ballantyne brought out was almost included in the title of the paper. The union itself might almost include the two

unions. If the matter were remitted to the Research Committee, he (the President) thought it might be arranged in a very amicable way with the meter makers.

Mr. MYERS thanked the members for the manner in which they had received his paper. They seemed to be all of one mind in regard to the matter—that it was one of extreme desirability; and there appeared nothing standing in the way of its being adopted, except the steps which they should take to carry it into effect. Mr. Hepworth referred to the former application to the Standards Department. Well, he had lately entered into correspondence with them; and he found that communications had been made to the department in 1867. But the matter fell through, for the want, he supposed, of such an Association as theirs pressing them to an issue. The other point which would call for any comment was that made by Mr. Macfie, that the 3-light meters might be made with ⅝-inch unions. In these first two or three sizes, he (Mr. Myers) suggested that they should have a range—that besides having uniformity of unions, they should, further, have a small range of change of screws—of different sizes, because every gas-fitter knew of a place where there was a 3-light meter where there ought to be a 5-light, and he knew also of a place where there was a 5-light, where there ought to be a 3-light one. In putting these four pairs together, therefore, in a common union, he had the idea of effecting a little change, even in sizes of meters, as well as in having common screws for them.

The PRESIDENT, in proposing a vote of thanks to Mr. Myers, asked if he was to take it that the remit to the Research Committee to go into the matter was agreed to.

The suggestion was assented to.

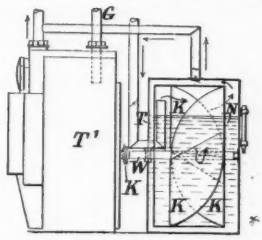
Effect of Gas-Stoves on Coal Traffic.—It is not often that gas supply figures in the proceedings at the half-yearly meetings of the great Railway Companies; yet it has done so lately at those of the Great Eastern Railway Company. Addressing the shareholders last Tuesday, Lord Claud Hamilton had to announce a falling off to the extent of £36,000 in the Company's coal traffic, in spite of the increase which has taken place in the population in their district. He attributed this mainly to the diversion of trade caused by the great coal strike of 1893; but another cause was, he said. the substitution of gas and oil stoves for open grates—a change which was really working a silent revolution in the domestic arrangements of large masses of the people. His Lordship went on to say that, in the suburbs which the Company served, he found the large Gas Companies estimated that they had 90,000 gas-stoves hired, as against 80,000 at the end of 1893; and they were steadily increasing. Therefore, taking the number of stoves mentioned, it meant about 90,000 tons of coal less consumed in the district served by these companies; and the bulk of this coal would have been carried by them. The same tale came from the large towns and country districts. This movement really began in earnest during the coal strike of 1893. The miners were led into the strike under bad advice, regardless of the inconvenience they would cause to the public and to their fellow-labourers in other industries; and their fellow-labourers were driven to obtain fuel other than coal. Thus the heaviest blow which the consumption of household coal had received had come, not from the capitalists or the "classes," but from the miners themselves.

Society of Chemical Industry.—The annual meeting of this Society was held at the Yorkshire College, Leeds, last Wednesday, under the presidency of Dr. T. E. Thorpe, F.R.S. The Secretary (Mr. C. G. Cresswell) read the Council's annual report, which showed that the number of members on the register is now 2892, as compared with 2828 at the preceding annual meeting. During the year, 226 new members were elected, as compared with 251 in the previous year; and 160 members were removed, as compared with 207. During the session, 85 papers appeared in the Society's *Journal*, as against 77 in the previous one. The excess of revenue over expenditure amounted last year to £178 10s. 2d., as against £574 17s. 9d. in 1893. For this diminution in the balance, the increase in the size of the *Journal* is entirely responsible; the actual revenue of the Society showing an increase of nearly £100. The report having been adopted, the Hon. Treasurer (Mr. Rider Cook) submitted the financial statement; and it was passed. The President then delivered his Inaugural Address, an extract from which, dealing with the subject of the enrichment of gas, will be found in another column. At the close of the address, a cordial vote of thanks was passed to Dr. Thorpe. The result of the ballot for the election of officers for the current year was subsequently announced—the new President being Mr. T. Tyrer; and it was resolved to hold the next meeting in London. The Mayor of Leeds (Alderman Gilston) having given the Society a hearty welcome—remarking, in reference to the President's observations on the subject of enrichment, that to increase the illuminating power of the Leeds gas by one candle would cost £20,000, and he thought it was not worth it—the proceedings closed. The members then took luncheon together; and in the afternoon, various works were visited. In the evening, the Mayor emphasized the welcome accorded by him earlier in the day by inviting the members to a *conversazione* in the Town Hall, which was handsomely decorated for the occasion. Between 600 and 700 ladies and gentlemen accepted the invitation.

REGISTER OF PATENTS.

Heating and Illuminating Gas.—Daus, E., of Schöneberg, near Berlin. No. 13,114; July 6, 1894.

This invention relates to "the production of an intensely hot flame by the use of a mixture of gas and air, prepared before the entrance of the same into the burner-pipe, in the manner that a drawing or suction device in connection with an ordinary gas-meter fixed to a gas-supply pipe draws air and mixes the same in a suitably regulated quantity with the gas as this leaves the meter and before entering the burner-pipe."



The mixing apparatus consists of two casings, in each of which is a rotary drum, mounted on the same shaft W. The drum in the casing T is chambered, and serves for drawing and delivering air; the other drum in T^1 is for measuring and delivering gas. Both drums are in communication with a pipe leading to the burner-pipe. The gas-drum and casing have preferably the form of an ordinary gas-meter; and, like it, the drum is operated by the pressure of the gas in the outside gas-supply pipe G. The drum thus driven transmits its motion to the air-drum, so that, for a given quantity of gas, there is a certain amount of air delivered for mixture with it. The air-drum, constructed with vanes K, is so designed that there is no back-pressure for it to overcome in delivering the air, which enters at one side, and passes out at the top as shown, whereby the capacity of the drum chambers formed by the vanes may be regulated by the height of the water N which is supplied to the drum-casing. By means of the vanes, several chambers are formed, the capacity of which is regulated by the height of the water.

The apparatus works as follows: The gas flowing to the gas-drum drives this and the air-drum also. The latter delivers air to a pipe leading to the gas-pipe; and when gas is passing thereto from the gas-drum in a measured manner, the mixed gas and air flows to the lighted burner, where it produces a noiseless blue flame, by which any "glow attachment" is heated, so as to diffuse an intense light.

With burners which also act as mixers, says the patentee, a constant composition of the mixture is not attainable, as the pressure of the gases in the burner-pipe varies—sometimes more and sometimes less air being carried along; while in the mixing apparatus the air is drawn by chambers which, when once made suitable for a certain mixture, always supply the same quantity.

Prepayment Meters.—Orme, D., of Oldham. No. 16,281; Aug. 27, 1894.

This invention is more particularly applicable in conjunction with the arrangement of meter described in patents No. 18,490 of 1890 and No. 15,740 of 1893. In the specifications of these patents, coin-receivers are described with which are combined means for increasing or diminishing the quantity of gas delivered in accordance with the price of gas. The chief points of the present invention are the employment of a coin-receiver of simplified construction and working, and the transference of the means for increasing or diminishing the quantity of gas to be delivered from the coin-receiver to gearing or parts not forming a portion of the coin-receiver, and "thereby rendering more difficult or impossible the fraudulent manipulation of the meter."

Fig. 1 [next page] is a front view of the dials and mechanism of such a prepayment meter; fig. 2, a plan of fig. 1; and fig. 3, a side elevation at right angles to fig. 1.

A branch D projects from the casing in which are the valve-spindle and valve; and this branch contains the worm-spindle, the outer end of which terminates in a disc carrying two driving projections. On the end of the branch, is fitted a hollow cylindrical casing E, which contains a revolvable cylindrical body F, formed with a coin-receiving slot. A short spindle projects from the cylinder F through the outer end of the casing, and is furnished with a handle, whereby it may be turned. The cylinder is recessed at its inner end, to admit the projections already referred to. The cylinder is also cut out midway; and at the outer end it is checked, so as to present two shoulders, which are intended to limit the revolution of the cylinder by coming in contact with a stop-pin H, screwed through the end of the casing. The coin-receiving slot goes entirely through the cylinder F, and is wide enough at the top to receive a proper coin—say, 1d. At the foot, the slot is contracted, so that the coin shall not drop through the cylinder, but will remain therein until the cylinder is turned. On the other hand, if a smaller coin should be inserted, the slot is wide enough at the foot to let it drop entirely through into the coin receptacle as soon as the cylinder is moved, without affecting the apparatus at all. The casing E has a slot in it; so that, when a coin of the proper size and value is used, it drops down into the slot in the cylinder, and rests upon the contracted edges of the slot beneath. In this position, the projecting edge of the coin on one side of the cylinder has entered between the projections on the disc. The cylinder may now be turned by means of the handle; and the edge of the coin, as it is carried round, engages with the projections, and, acting like a screw-driver, turns both the disc and the spindle. This has the effect of advancing the cam, and opening the gas-admission valve, as described in the former patents.

When the cylinder has been turned round rather more than half a revolution, the wide end of the slot and the contained coin come opposite to the delivery slot in the casing leading to the coin receptacle; and the coin drops through the slot. At the same time, the shoulder

comes against the stop H, and further rotation of the cylinder is arrested. The cylinder is now moved back—the spindle remaining in the situation to which it has been turned; the projections having been left in a position which enables the next coin inserted to slip between them. In turning the cylinder back, the shoulder comes against the stop H, and arrests the cylinder in a position which brings the slots exactly in line, and ready to receive another coin.

Fig. 1.

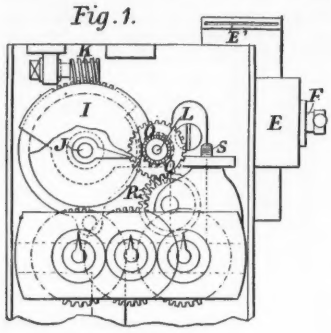


Fig. 2.

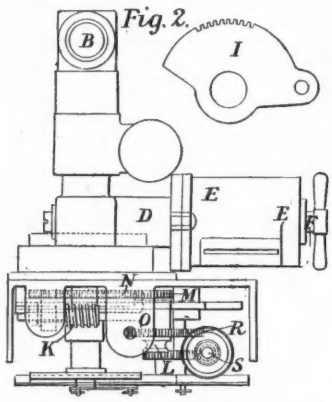
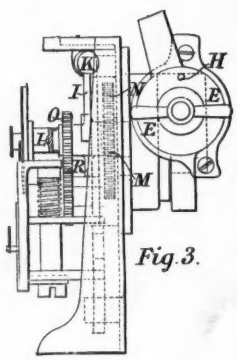


Fig. 3.

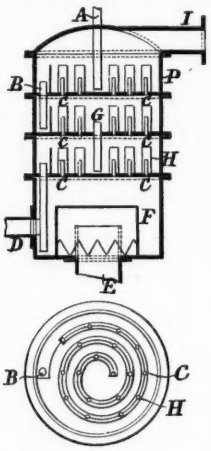


As the cylinder fits the casing closely for a portion of the circumference, it is impossible for a fraudulent consumer to recover the coin by attaching anything to it. Further, as already mentioned, a smaller coin than the appointed one would also fail to actuate the mechanism, as, before it could operate the spindle, it would drop through the contracted end of the slot. In the apparatus described in the earlier patents, means were combined with the coin-receiver for varying the quantity of gas to be delivered in accordance with differing prices for gas. In the present apparatus, by using a change-wheel having more or fewer teeth, the wheel, and consequently the bowl which operates the cam and valve spindle, is moved at a determinable rate of speed, and more or less gas is delivered to the consumer. To effect this, an adjustable quadrant I is mounted loosely upon a sleeve on the outer end of the valve-spindle J. The quadrant (shown separately) is furnished with teeth on its periphery. Above it, and gearing therewith, is a worm K; the spindle of the worm being carried in a bearing projecting from a bracket on the frame of the apparatus. By turning the spindle and worm, the quadrant can be adjusted to any desired position; and, when set, the quadrant is locked by the worm K, and therefore requires no separate locking means. One side of the quadrant I has a boss carrying a short spindle L, the inner end of which is furnished with a toothed pinion M gearing with a similarly toothed spur-wheel N, mounted on the axis of the cam, and operating by means of a bowl carried on a bracket to move the valve-spindle to-and-fro, as described in the earlier patents. On the other end of the spindle L is a change wheel O, which can easily be replaced by a wheel having a greater or less number of teeth.

The wheel O gears with, and is driven by, the pinion R, which is part of the gearing of the meter—receiving motion from the upright shaft S or other driving means from the measuring cylinder of the meter. As the wheel is thus the medium of communication between the mechanism of the meter and the means for closing the gas-supply valve at B, the quantity of gas passed through the meter between the opening of the valve by the insertion of a coin and the operation of the coin-receiver and the closing of the valve by the revolutions of the meter may be varied—either more or less gas being passed, according to the number of teeth in the wheel.

Gas-Washer.—Pettigrew, G., of Middlesbrough. No. 17,395; Sept. 13, 1894.

This washer is made up of a series of shallow trays, the area of the bottoms of which is divided off in the form of a helix. The water or other liquid by which the gas is to be washed, is let into the washer at the top by the pipe A to the centre of the helix formed in the top tray P, flowing round each circumvolution of the helix from the centre to the overflow-pipe at the circumference, and down this overflow (the lower end of which is sealed by the liquid) to the circumference of the next tray. The liquid now flows round each circumvolution of the helix, from the circumference to the centre overflow-pipe G; and down this pipe to the centre of the helix in the next tray. Here the lower end of the overflow is sealed in the liquid, similar to B. After passing through any number of trays, the liquid finds an exit from the washer by the overflow-pipe D. The gas to be washed enters at the bottom by the pipe E, the open end of which is covered by a hood F much larger than itself. The hood is serrated round the circumference, to a depth less than the height of the overflow from the bottom of the washer—thus ensuring the serrations being always covered with liquid. The pressure of the gas depresses the liquid under the hood F, passing out through the serrations, and up through the liquid, and through the openings C in the helix, into the helical



hood H covering the helix. The gas depresses the liquid under the hood—passing out through the serrations; up through the liquid; and then through the openings C into the hood H of the next tray. Here the process of washing is repeated; and the gas then passes through any number of trays—finally leaving the washer by the pipe I. The depth of the helix in each tray being always more than the height of the overflow, ensures the liquid flowing round each circumvolution of the helix to the overflow.

Incandescent Gas-Lamps.—Moeller, J., of Falmer Street, Westminster. No. 9070; May 7, 1895.

The patentee remarks that, when incandescent gas-burners are employed for street lighting or in localities subject to vibration or shaking, the mantle is apt to give way, owing to the vibration conveyed to it through the burner and the post or other frame which supports it, and the pipe which leads to it. The object of the present invention, therefore, is to provide against the communication to the mantle of such shaking or vibration as might cause it to give way, by providing an elastic support for the burner.

Fig. 1. *Fig. 3.* *Fig. 2.*

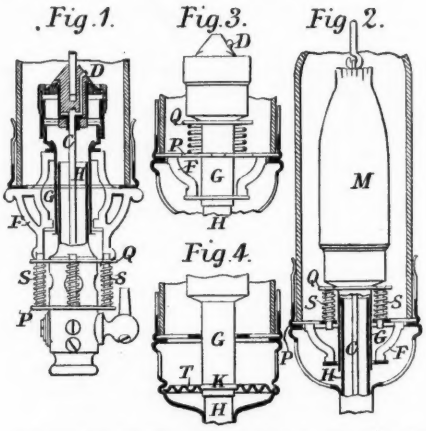


Fig. 4.

Fig. 1 is an elevation (partly in section) of a burner similar to that described in patent No. 10,587 of 1894, with an elastic support. Fig. 2 is an elevation partly in section, showing a modification. Fig. 3 illustrates a further modification, in which a single spring is employed. Fig. 4 is a part section of an elastic diaphragm support.

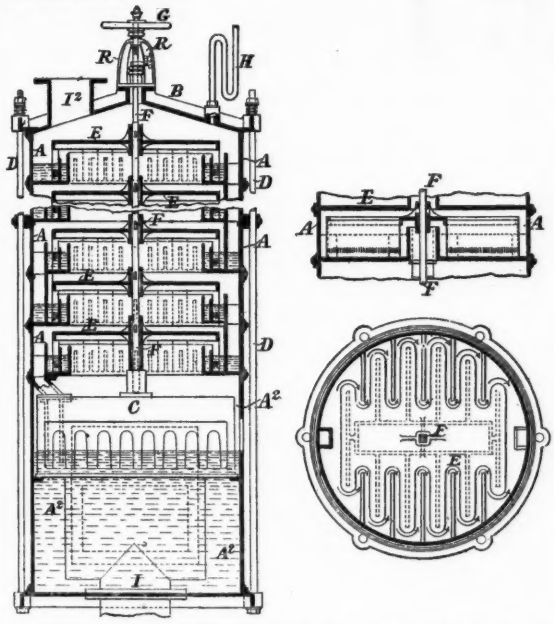
The elastic support applied to existing burners is fixed on the shoulder just above the stopcock. An annular plate P having several stud-pins S (of which four are shown) is fixed in and projects up from it; each being surrounded by a helical spring. On these springs rests another annular plate Q, having holes through which the pins S freely pass. On the plate Q rests the frame F of the gallery, which carries the upper part of the burner. The outer tube G of the burner being free to slide on the inner tube H, and also the top of the central tube C, which supplies the pilot-light D, being free to slide in the hole which it enters, the gallery and burner with the mantle supported on it rest entirely on the springs; and thus any vibration or shaking of the parts below is deadened before reaching the mantle.

As shown in fig. 2, the burner only, and not the gallery, is supported on the springs. For this purpose, a frame-plate P, with arms projecting into an internal groove of the gallery, has holes through which freely pass the stud-pins fixed in, and projecting down from the upper plate Q. The springs interposed between P and Q deaden the vibrations, which might otherwise be communicated to the burner, and thus destroy the mantle M.

As shown in fig. 3, a single helical spring is interposed between P and Q, and in fig. 4 an elastic diaphragm T (which may be a disc of thin sheet metal circularly corrugated) carries the burner, a collar K of which rests upon the middle of the diaphragm, while the outer edge of the diaphragm rests on an internal ledge of the gallery.

Washing and Scrubbing Gas.—Walker, C. C., of Donnington, Shropshire. No. 9556; May 14, 1895.

The claim for this invention of apparatus for washing and scrubbing gas is for "a tower consisting of the combination of a series of superposed trays or divisions, with or without a tar-extractor at bottom; each tray or division being provided with an opening at the bottom (for the passage of gas) surrounded by upwardly extending sides; ribs or projections extending upwards from the bottom of the tray or division, and interposed or arranged so as to form a circuitous passage for liquid passing through the tray; a hood provided with a depending rib shaped to correspond to, and caused to enter the circuitous passage formed by the ribs; perforations or slots in the depending rib of the hood, through which gas is caused to pass; a rod or spindle, to which the hoods are attached; and means whereby the spindle with the hoods may be raised and lowered, so as to vary as required the depth of seal and back pressure."



As shown in the engravings, the apparatus consists of a tower, composed of several divisions or trays A placed one on top of another—the tower being built to any desired height. Each division is provided at its upper end with a socket, to receive the lower end of the next tray above; the socket on the uppermost division receiving a rim formed on the cover B of the apparatus, and the lower edge of the lowermost division entering a socket formed on the upper edge of a chamber A^2, containing a tar-extractor C, as described in patent No. 3619 of 1881. The several trays A are connected together, and to the cover B and the chamber A^2, by tie-rods or long bolts D, tightened up by nuts screwed on to the rods—preferably with springs interposed, so as to allow of expansion and contraction without affecting the stability of the structure.

Each division or tray is provided in the bottom with an elongated opening, surrounded by upwardly extending sides. Projecting upward from the bottom of each tray are ribs—one set extending from the sides of the opening to within a short distance of the rim of the tray, while the other ribs (which are interposed) extend from the sides of the tray to within a short distance from the sides of the opening, thereby forming a circuitous passage between the ribs. At a short distance from each end of the elongated opening, is a rib projecting from the bottom of the tray, parallel to the other ribs, and extending in both directions to within a short distance from the sides or rim of the tray. In the bottom of the tray on the outer side of one of these latter ribs is an opening, having upwardly extending sides, through which liquid passes into the division or tray below. Another opening is provided at the diametrically opposite side of the trays, into which the liquid from the tray above passes—the opening being situated between the rim or side of the tray and the rib at that end of the elongated opening.

These openings are surrounded by upwardly projecting sides, extending to a level with the top edge of the rim of the tray; so as to form a continuation of the opening in the tray above—the sides having passages at their lower ends through which the liquid passes into the tray. In each tray is placed a hood E, having a depending thin metal rib of an endless corrugated or serpentine form. The hoods are carried on a vertical rod or spindle F, which extends from outside the cover B through all the trays, and is supported at its lower end in a footstep on top of the tar-extractor C. The upper end of this spindle is screw-threaded, and passes through a stuffing-box on the cover B, into a bearing in a bracket R fixed on the cover—a wheel-nut G being screwed on to the spindle, and caused to bear on the bracket R, so that, by turning it in one direction or the other, the spindle F, together with the hoods E, may be raised and lowered as required. Near the lower edges of the ribs of the hood E are perforations or slits through which the liquid and gas can pass. The liquid is admitted to the uppermost tray of the series by a syphon or bent pipe H, and flows downwards over and through each tray in succession, and out from the apparatus by an outlet in the chamber A^2 containing the tar-extractor.

The gas to be washed enters the apparatus by the inlet-pipe I, and passes upwards into the tar-extractor C. From thence it passes into the lowermost tray A, through the central elongated opening therein; and thence over the upwardly projecting sides of the opening. As this opening is covered by the hood E, the gas is caused to pass down into and through the water contained in the tray, and through the perforations in the depending rib of the hood, to the exterior of the hood. The gas then flows from this lower tray into the next tray above; through the liquid contained therein; and so on upwards through all the trays of the series. It finally passes from the apparatus through the outlet I^2. The gas "is thus caused to pass through a continuously flowing stream of liquid travelling in a circuitous direction, the reverse to that of the gas, whereby the ammonia and other impurities contained in, or combined with, the gas are effectually absorbed by the liquid." By means of the wheel-nut G, the hoods E may be raised more or less above the bottoms of the trays, to admit of the gas passing through a greater or less depth of liquid on each tray before going through the slits; the depth of seal and back pressure being thus regulated as required.

Conducting Air to the Flames of Gas-Burners.—Schülke, A. H. J., of Berlin. No. 10,463; May 27, 1895.

This invention relates to means for conducting air to the flames of gas and other lamps or burners for lighting and heating purposes; the object aimed at being "to spread out and flatten the flame, whereby the illuminating surface is enlarged, complete combustion of the gas or vapour is secured, and a perfectly white flame is produced." By these means, it is also possible, it is claimed, to burn the heaviest hydrocarbon vapours and gases without depositing carbon, and without the necessity of using very fine passages. The spreading of the flame and securing complete combustion are produced by an air-supplying device in which the flame itself is situated at the meeting point of two or more jets of the air intended to support combustion—such jets of air being directed against one another by suitably formed and directed channels or passages. The jets of air impinge upon one another, and are broken up; thereby effecting an "energetic spreading out of the flame, and a complete combustion of all the hydrocarbon therein."

Fig.3.

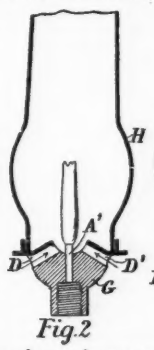


Fig.2

Fig.1

Fig. 1 is a vertical section of a gas-burner suitable for burning heavy gases. Figs. 2 and 3 are vertical sections (at right angles to one another) of a modification of same.

The burner shown in fig. 1 consists of several small burner-tubes A, leading through the cover of the inlet-passage B, which screws on to the gas-pipe. These burner-tubes pass at their upper ends through a ring C, in such manner that they stand in a circle therein; and the small gas-flames burning at the upper ends of the tubes, combine together into a "closed crown of flame." In order that this effect should be accompanied by the widest possible spreading of each small flame, the ring C has on each side of every one of the tubes A channels D D^1, which converge towards the mouth of each such tube; the channels serving as air-passages, and allowing the air entering through the openings F of the burner jacket E below the chimney H to act in jets directed against one another and against each small flame, somewhat like the jet from a blow-pipe.

In the burner shown in figs. 2 and 3—in which there is only one central burner-tube A^1—the air channels D D^1 are formed in the cast body G, which contains the thread for screwing it on to the gas-pipe, and at the same time forms the gallery for the chimney H.

APPLICATIONS FOR LETTERS PATENT.

13,867.—Arrol, Sir W., and Foulis, W., "Charging gas and other retorts." July 20.

13,879.—Goodson, J., "Gas-burners." July 20.

13,938.—Hooker, W. and L., "Solution for illuminant mantles for Bunsen gas-burners." July 22.

13,959.—Lapointe, H. L. A., "Manufacture of oxygen." July 22

13,960.—Petrèano, E., "Carburettors." July 22.

14,009.—Spiel, C., "Vaporizing and igniting devices of gas and similar motors." July 23.

14,053.—Denayrouze, L., "Mixing gas and air supplying incandescence burners." July 23.

14,069.—Rotherham, J., "Swivel joints for tubes or the like conveying liquids or gases at a pressure." July 23.

14,090.—M'Gillivray, J., and Ayton, J. G., "Gas-heated ovens for baking." July 24.

14,115.—Rickman, W. B., "Intermittent gas-lights." A communication from R. and O. Pintsch. July 24.

14,171.—Bosted, D. T., "Preventing the freezing of water in service-pipes, cisterns, and the like." July 25.

14,189.—Connor, J., "Stopping leaks in water-pipes or other pipes conveying fluids or gases." July 25.

14,197.—Glover, R. T. and J. G., "Preventing persons fraudulently operating coin-freed apparatus." July 25.

14,198.—Tourtel, J. M., "Prepayment gas-meters." July 25.

14,200.—Bennett, R. G., "Mixing air and gas for incandescent lighting and heating." July 25.

14,208.—Bichel, C. E., and Schulte, E., "Producing inexplosive acetylene gas." July 25.

14,242.—Ladd, J. H., "Explosion-engines and gas-generators to be used in connection therewith." July 26.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Mr. Young's Paper at the North British Association.

SIR,—I do not think that Mr. Young's answer would exactly please Mr. M'Gilchrist, who, unable to discuss the brilliant paper he had listened to, remarked that "they had heard a lot of 'rot' about illuminating power and illuminating value," and asked Mr. Young to give them some further information upon the subject. The circumstance that he desires some further information on the subject is the one redeeming feature in Mr. M'Gilchrist's attitude. There is always hope for the man who desires "some further information."

Possibly in the face of Mr. Young's admission that the question bristles in many ways with difficulties, and that he preferred to be allowed to shirk it, Mr. M'Gilchrist may now be induced to think that, after all, there is something in it, and that, at least, the term "rot" is hardly applicable as a description of what has been written and spoken on the subject. Opprobrious epithets will not supply want of argument, or make up for narrowness of view.

As bearing upon the complex question of luminosity and the diffusive or "quantity" power of lights, I may call attention to the recent article* of M. Poincaré in the *Revue Générale des Sciences*, in which it is pointed out that the cathode rays produced in vacuum tubes (a discovery of Professor Crookes) do not issue in straight lines, but actually turn round opaque bodies.

I would suggest, further, that, in a discussion of the interesting subject of light diffusion, the inquiry whether the direct ray does not propagate other rays at right angles to itself, is also worthy of consideration.

THOS. NEWBIGGING.

5, *Norfolk Street, Manchester, Aug.* 1, 1895.

Effect of Admixture of Gas and Air on the Illuminating Power of Gas.

SIR,—In Professor Lewes's paper on "The Combustion of Coal Gas for Fuel Purposes" he describes a new burner invented by M. Denayrouze, which gives 27 candles of light per cubic foot of gas consumed. This excellent result the Professor attributes to the complete and thorough admixture of gas and air, as supplied to an atmospheric burner, by means of an electric fan, whereby the heat of combustion is greatly increased. On reading this, it occurred to me that the same result ought to be obtained if the gas and air were thoroughly mixed and consumed in a suitable burner; and a few experiments have been made which certainly seem to prove that the theory is correct, for the illuminating power is improved quite 50 per cent.

The best results obtained have been 20 candles per cubic foot of gas consumed; and this was with a mixture of four of air to one of gas. The percentage of air will, of course, vary with the composition of the coal gas; and experiments have to be conducted with care, as a small increase in the percentage of air would make an explosive mixture. An apparatus, however, could be designed for working such a system which would prevent any danger of an explosion, and would be a far simpler plan than that proposed by M. Denayrouze. With the increase of heat produced, the durability of the mantle must be considered; but lengthy experiments only can decide this matter.

FRANK LIVESEY.

South Metropolitan Gas Company, Aug. 3, 1895.

Gas Flames and Luminosity.

SIR,—The article in this week's JOURNAL, on "Gas Flames and Luminosity," contains many interesting suggestions in connection with the relative value, to the consumer, of high and low power gas; but it appears to me that some of the statements made in regard to the gas supply of Manchester are more sweeping than economical considerations would justify.

Mr. Irwin is probably correct when he states that the 20-candle gas supplied in Manchester, when burned in a No. 4 Bray's union-jet burner, will give a light value of 12½ candles only. This merely proves that consumers use a burner which is not the most suitable for the gas. But do they generally use the most suitable burners? As Mr. Irwin says, they prefer the union-jet burner; and it is pretty certain they would continue to use this burner if the illuminating power of the gas were reduced. What amount of light would a consumer get out of a union-jet burner from gas of 14 or 16 candle power? On this point, information is wanted before it can be definitely ascertained that, in paying a lower price for gas of inferior quality, the consumer would save money.

Another factor required to be known, in order to determine this question, is the amount of reduction that would be effected in the cost of the gas by diminishing its illuminating power; and, *pari passu*, the proportion of cannel carbonized. The cost of enrichment by cannel in Manchester and in London are two very different items. If the use of cannel were entirely abandoned in Manchester, the saving effected would not exceed 3d. per 1000 cubic feet of gas sold. Now suppose that this were done, and gas of 16-candle power were supplied, instead of 20-candle gas. How would the consumer benefit thereby? He would consume the 16-candle gas as he does the 20-candle gas in union-jet burners; and, assuming that the burner effected an equivalent reduction in the light-value of the gas, he would get the value of 10 instead of 12½ candles. I do not know what light-value a union-jet burner gives with 16-candle gas; but I am not aware that it is more suitable for burning such gas than for burning 20-candle gas. In fact, I should expect it to be less so. The consumer would be paying one-ninth less per 1000 cubic feet for his gas than at present, and would get one-fifth less light for his money. Would he be content with the reduction? I hardly think so. I imagine he would seek to get as much light as he had previously been accustomed to; and he would do this by increasing his consumption. The result of this would be that he would, in the end, pay more for an equal amount of light than he had previously done.

* Referred to in the JOURNAL for Dec. 4, 1894 (p. 1067).

I am aware that the proportion of one-ninth in the reduced cost of the gas to the consumer is not the same as the actual reduction in the cost of manufacturing the gas; because all other charges but that for the material carbonized remain the same. This, in actual practice, is unavoidable.

Such a reduction in the illuminating power and in the price of the gas, would result in a large increase in the general consumption; but I doubt whether the Corporation would in consequence be enabled to make and distribute the gas more cheaply. When a certain magnitude of operations has been reached, further economies in manufacture are not to be expected from an increasing business. Nor do I think the charges on capital account would, in consequence, become less; seeing that they are already as low as they can be in Manchester. The only way in which an increased business could be conducive to a reduction in the cost of the gas to the consumer, would be by providing a larger quantity of gas over which to distribute the net profits of the undertaking.

I am, however, far from thinking that enrichment by the use of cannel only should be continued in the future. I consider Mr. Irwin has done us good service in showing the useful effect of benzene as an enricher. What I should like to see is the benzene retained in the gas from the beginning, instead of being afterwards returned to the gas by enrichment. But the realization of this presents difficulties hitherto only partially overcome.

I am also of opinion that gas of practically equal quality with that which it has been customary to make in Manchester may be supplied with the use of less cannel than has hitherto been carbonized. The difference between 18½ to 19 candle gas and 20-candle gas is practically inappreciable to the consumer; but a drop of one to one-and-a-half candles means a considerable saving of cannel. To change from 20-candle to 16-candle gas would, on the other hand, cause universal discontent among the consumers, and would certainly not be compensated for by the reduction in price which it would permit.

G. E. STEVENSON.

Manchester, July 31, 1895.

The Lighting of the Victoria Embankment.

SIR,—I have noticed with much interest, in recent issues of the JOURNAL, that the above subject is engaging the attention of the London County Council. It is a subject which I am confident will prove of great interest to a large number of your readers; and for this reason, and in the interests of gas, I beg to draw attention to a few of the disadvantages put upon the illuminant when used for incandescent lights in the existing and utterly unsuitable form of lanterns.

In the first place, there is the heavy unsightly framework, with its horizontal and downward shadows—bad with any system of lighting, but much aggravated by any concentrated light like the incandescent gas-light. Secondly, the very bulky or roomy lantern is much out of place and keeping with this concentrated light. It loses much of its lighting effect thereby, and has the appearance of something wanting; giving a far from satisfactory or pleasant result when compared with the same lantern having its usual consumption by open flat flames therein, for which it was designed and constructed. Then the pilot-light at present in use with the incandescent system needs careful attention, for at least 10 per cent. will persist in failing their purpose. An unfailing pilot-light, or the means of lighting from the ground, and without opening the lantern, or requiring the aid of a ladder, is an essential much required.

With these serious disadvantages and drawbacks removed, and fair play allowed as to the cost of each system, electric or gas, few doubts need be entertained by the gas engineer or the gas company as to the success of the latter.

OBSERVER.

July 27, 1895.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Tuesday, July 30.

(*Before Justices* CAVE *and* LAWRANCE.)

Southwark and Vauxhall Water Company v. Evershed.

This case, which was argued before the Court on the 9th of April last,* raised a question as to the interpretation to be put upon the words in regulation No. 21, made by the Board of Trade under the Metropolis Water Act, 1871, which provided that every water-closet service-box should have an "efficient waste-preventing apparatus, so constituted as not to be capable of discharging more than two gallons of water at each flush." The Magistrate held that the waste-preventer in use was not capable of discharging more than the specified quantity, unless it was deliberately caused to do so; and from this decision the Company appealed.

Justice CAVE said he had had very great doubt about the case; but, on the whole, he thought the Magistrate had decided rightly, though he could not agree with the reasons he had given for his decision. The addition the Magistrate made to the rule, "unless done deliberately," was not warranted by anything in the regulations or in legal principles. The case only stated that the cistern was capable of discharging water so long as the chain was kept at a certain tension. If there had been any evidence of the existence of a nail or a hook by which the chain could be fastened down, or of any weight attached to the chain so as to hold it down, he should have thought that the occupier had violated the regulation, and incurred a penalty. But if there was no evidence of such apparatus intended to hold the chain down in the absence of any person, in accordance with the maxim "*De minimis non curat lex*," the fact that a little water in excess of the two gallons would escape so long as the chain was held down by the hand was not sufficient to bring the case within the regulation.

Justice LAWRANCE said he entirely agreed with the result at which his learned brother had arrived; and he did so without having ever felt any doubt upon the matter.

The appeal was accordingly dismissed, with costs.

* See JOURNAL, Vol. LXV., p. 853.

CROYDON QUARTER SESSIONS.—Friday, July 26.

(*Before Mr.* R. G. GLENN, LL.B., *Recorder, Alderman* MILLER *and Dr.* STRONG.)

Croydon Gas Company v. Assessment Committee of the Croydon Union.

This was an appeal by the Croydon Gas Company against the assessment of their property by the Assessment Committee of the Croydon Board of Guardians.

Mr. BALFOUR BROWNE, Q.C., Mr. DANCKWERTS, and Mr. BARNES appeared for the appellants; Mr. LITTLER, Q.C., and Mr. E. PAGE represented the respondents.

Mr. BALFOUR BROWNE, in opening the case, remarked that, as far as he could see, there would be no complications. The Company were incorporated by an Act passed in 1847; and they obtained another Act in 1860. The capital had been increased; and the Company had lately amalgamated with the Carshalton Gas Company, so that a portion of the undertaking was under the jurisdiction of that Court, while a portion would also come under that of the Court of Quarter Sessions for Surrey. In Croydon the initial price of gas per 1000 cubic feet was 4s. 7d.; and the charge, 2s. 9d. In Carshalton, the initial price was 4s. 7d.; and the charge, 3s. 6d. Some time ago, the Company's undertaking was valued by Mr. H. E. Jones, who fixed the amount at £21,170. On this being appealed against, the Assessment Committee seemed to take the view that their contentions were wrong; and they reduced the figure from £21,740 to £21,170. The only item with which he had to deal was one of £18,343, which included the whole of the property of the appellants within the jurisdiction of the Court. The principle followed was the one usual in these cases. They had to ascertain what rent a tenant would be reasonably expected to pay for the property, and what he would look for in the way of profits. The usual allowance was 10 per cent., which, added to 5 per cent. interest on capital, made 15 per cent. Then there came in the question of casualties, which had generally been estimated at about 2½ per cent. Consequently, they had as the occupier's share of the profits 17½ per cent. Then they had to deduct a sum that would be necessary to maintain the hereditaments in a condition to command the rent; and when this had been taken off, it represented the amount which was to be the basis of the rateable value. Taking everything, therefore, into consideration, it brought out a total rateable value amounting to £12,573. Dividing this up, and apportioning the amount which related to the borough of Croydon, they arrived at a sum of £11,717, as against the amount standing in the rate-book—viz., £18,343. He thought that, on the whole, the Court would come to the conclusion that the figures he had put forward fairly represented the rent a tenant might be expected to pay from year to year.

Evidence was then called on behalf of the appellants.

Mr. *E. Ryde* said he had made a survey of the Gas Company's property; and he brought out the rateable value of the whole concern at £12,573. This figure had been arrived at from the Company's audited accounts. The gross receipts amounted to £78,688; and deducting working expenses, &c., the net receipts were £33,609. The amount of the tenant's capital was £64,000, from which the usual 17½ per cent. had been deducted.

In cross-examination by Mr. LITTLER, witness admitted that the Company had largely increased their business—the quantity of gas sold having augmented by 85 per cent. since 1883—that the dividends had gone up 2 per cent., and that the meter-rents were higher by 41 per cent. He said the rateable value of the property was, no doubt, considerably out of proportion to this. He was not attached to the 17½ per cent. which had been allowed for tenant's profits.

Mr. LITTLER: At present, good securities have dropped to 2½ per cent.

Witness: Yes; that is in real property or in the Funds.

Is it not a fact that, in large trades and businesses, people are now compelled to put up with much less interest than formerly?—I have no doubt that is so.

If a man desired to invest his money, he would be told he must expect a less return than was the case fifteen years ago?—As a general proposition, I will not deny that. But 17½ per cent. is not too much in the present case, considering the increased fluctuation of prices, strikes, and so forth.

Re-examined by Mr. BALFOUR BROWNE, witness stated that, taking the amount of the profits alone, the rateable value of the property might be a little over £15,000; but it would not be justifiable to put it at £18,000. The tenant coming in would look at the profits actually earned, and not at the dividend paid.

Mr. *H. E. Jones*, M.Inst.C.E., said he had gone into the circumstances of the Company, and examined their works; and he brought out the rateable value of the entire property at £12,800. He estimated the gross profits at £32,162; but he thought the amount received for sulphate would fall off this year something like 15 per cent. He estimated the gross future profits at £26,981. The price of tar had dropped considerably. The 17½ per cent. which had been referred to was a matter of course. This amount was given universally; 2½ per cent. was the usual allowance for risks and casualties. He was entitled to get 10 per cent. allowance on the rental value for maintenance, which would make his total valuation £500 less than the sum he had named. His calculations were based upon the actual working of the appellants. He could not find any other case in which the assessment was so high in proportion to the price charged as in Croydon—being equal to 3d. per 1000 cubic feet.

In cross-examination by Mr. LITTLER, witness said gas was being made at Croydon cheaper than at Carshalton. In making his calculations, he had not taken into account that coal carriage would cost less at Croydon than at Carshalton, as the difference in distance was only about half a mile. The residuals in Croydon fetched more than those in Carshalton. By the amalgamation of the Croydon and Carshalton Companies, a considerable saving had been made in the cost of administration. He considered that a saving of £111 had been effected in establishment charges. Witness then compared the average cost of working in the cases of the Croydon, Lea Bridge, West Kent, Mitcham, and Bedford Companies—the rate for Croydon being 1·79d. per 1000 cubic feet of gas manufactured; for Lea Bridge, 2·93d.; for West Kent, 3·18d.; for Mitcham, 2·92d.; and for Bedford, 1·95d. He considered the Croydon Company was among the first-rate gas companies of the kingdom. An allowance of 2½ per cent. should be made for risks. There were 8413 consumers on the books of the Company, with 8869 meters in use, at December last. In regard to the value of the meters, he had taken a list, from which he had deducted 10 per cent., and then taken 25 per cent. off that for depreciation. He did not allow for any depreciation in respect of the new meters. For heating-stoves let on hire, he allowed £9733. Witness gave further comparative figures.

Mr. *Corbet Woodall*, M.Inst.C.E., one of the Directors of the Company, said he attended before the Assessment Committee, and expressed his views on the matter before the Court. The net rateable value on which the Company paid was £10,801; but the new assessment had been fixed at £19,904. His own valuation worked out at £12,825 for the whole undertaking. Up to June last, the price of gas was 2s. 10d. per 1000 cubic feet; and it had now been reduced to 2s. 9d. The Company had been enabled to lower the price of gas in consequence of the saving effected in the management expenses. Had the Directors acted up to their powers, they could have shared the extra profits in dividend; but instead of this, they had given the consumers the benefit of it. To provide for maintenance, repairs, and renewals, he had taken 7d. per 1000 cubic feet as a fair rate to be expended from year to year. He considered that £6400 would be a very reasonable return to a man working the concern as a tenant.

In cross-examination by Mr. LITTLER, witness said that, if an application had been made to him by the other side to inspect the books, he should have refused to accede to it.

Mr. LITTLER then called Mr. *W. J. Russell*, the Company's Secretary, to produce the cash-book, as he wished to see how the revenue came in; and the further hearing of the appeal was adjourned.

Saturday, July 27.

On the resumption of the proceedings to-day,

Mr. *Corbet Woodall* was further cross-examined. He stated that the Company had no book in which the receipts for each month would be shown; but, if desired by the Court, the exact amount collected month by month might be ascertained.

Mr. LITTLER said he wanted the amount of each month's payments on revenue account, and each month's receipts. He would also like to have the balance for or against the Company in their banking account on the last day of each month.

Questions having been put in regard to meters,

Witness said it seemed to him that, in the interests of the inquiry, general principles should be accepted as to what was fair depreciation. This appeared to be far more satisfactory than trying to unravel the intricacies of the case. In further cross-examination, he said he thought that, in producing the accounts, they would be able to distinguish between ordinary repairs and the cost of maintenance and renewals. With regard to the collection of the accounts, he admitted it was effected in a shorter period than five months; and in four months of the year, they had what represented the expenditure of five-twelfths of the entire year. Although the business of the Croydon Company was growing, he objected to admit that the rateable value of the property was increasing. If they had made up the amount they had lost by reducing the price of gas 1d. per 1000 cubic feet, they would have to spend it on the other side. It was consequently strictly a set-off to the rateable value being increased, because, in order to get the amount back, they would have to spend more money.

Mr. LITTLER: In a table here, showing the price of gas and net receipts, I find that the receipts go up almost in proportion to the decrease in the price of gas.

Witness: Of course, it seems almost inevitable either that the net receipts must go up or the dividends drop if the price of gas is lowered.

In further cross-examination, witness gave particulars as to the price of residuals; remarking that at the present time the prices of tar and ammonia were low, while the value of coke had fallen considerably. With regard to what took place before the Assessment Committee, he virtually confirmed all he then said. Though the 17½ per cent. had been "crystallized," the tenant did not appear to have more than he was entitled to.

Mr. LITTLER: Does it not strike you that the business of gas making throughout the country is a steady-going and attractive one?

Witness: Yes; but it is subject to fluctuations.

Re-examined by Mr. BALFOUR BROWNE, witness said his valuation was carefully made, with the hope of securing an amicable settlement with the Assessment Committee; and he was glad to find it had been completely supported by such experienced men as Mr. Ryde and Mr. Jones. With the exception of the coke, which he had corrected, the valuation laid before the Court was the same as that submitted to the Committee. Before he put forward that statement, he went into all the figures he thought essential in order to get at the true rateable value. The amount collected each month, and the sums spent each month, were not, to his mind, necessary to arrive at a conclusion as to the amount of tenant's capital. If there were a month that showed no tenant's capital was required, and another month that it was, he repeated that, with his experience, he could not work with less than five-twelfths of the whole year's capital receipts.

This closed the case for the appellants.

Mr. LITTLER then addressed the Court for the respondents. He said this was a matter of considerable importance to the Overseers, as it was, no doubt, to the Company. But he might remind the Court that the present was a rateable value that had been attributed to the concern for twelve years; and one would suppose that the time had arrived when some reconsideration was due. In London, it was regarded as absolutely necessary that this should be done once every five years. Taking such undertakings as water, railway, and gas companies, the variations were far larger and far more important than in other directions; and the appellant Company were not the only people whose assessments had been revised in Croydon. The great Railway Companies running into the town had had theirs reconsidered; and fair principles had been applied. In 1883, the rateable value of the

Gas Company's property was put in the first instance at £11,200, but was reduced to £10,180 by the Assessment Committee; and, as he learned from Mr. Ryde, this was the figure which was arrived at by agreement between the parties as a compromise. If this were a fair amount, then it was quite clear that there must have been a great increase in order to raise the figures to anything like £15,000 on a rule-of-three sum on profits. But if it were taken on profits alone, he should say the sum ought to be much greater. Though they did not rate profits, they were compelled, in these commercial concerns, to have regard to what the profit probably would be, in order to arrive at what the tenant carrying on the undertaking would have to give for the property one year with another. Taking the published accounts of the Company, he would compare the year 1883 with 1894, on which the rate in dispute was made. The gross receipts for 1883 were £61,750; and for 1894, £103,195—an increase at the rate of 67 per cent. There had not been the same increase in the net profits, for the simple reason that, in the interval, the price of gas had been reduced from 3s. 3d. to 2s. 10d. per 1000 cubic feet. It was a very striking affirmation that, in lowering the price of gas, they got such an enormous extra consumption that, though they had to provide more coal, the net profits went up from £18,273 to £27,204, or 49 per cent. They found how very much more advantageous the lower prices were; for, even with the reductions he had named, the dividends paid had jumped up from 12 and 9 per cent. to 14 and 11 per cent. So that the tenant and landlord together were now getting something like one-sixth more for their money than they were formerly. Then the total receipts on the capital expended had duly risen from £212,000 to £310,000, or an increase of 46 per cent.; so that for 46 per cent. more money invested, the Company were making 49 per cent. more profit. In the quantity of coal carbonized, there had been a rise to the extent of nearly 94 per cent.; and in the gas sold, of 85 per cent. There had also been an increase of 52 per cent. in the number of consumers, and of 41 per cent. in the gas-rental.

The RECORDER: The point you make is that it has become a larger concern, requiring a larger expenditure, which increases in proportion to the growth of the business?

Mr. LITTLER said it was. He went on to adduce figures to show the stability of the concern. He said, in 1885, the receipts were only £52,000, and the price of gas was 3s. 3d.; but they rose to £56,000 the next year. Then in 1887, though the Company reduced the price to 3s. 2d., they reached £57,000. In 1888, they lowered the price by 2d.; and, as would be expected, they lost £1000. In 1889, they took off another 1d.; and, notwithstanding this, they more than recovered their position in 1887, when the price was 3s. 3d., and received £57,480, as against £57,700 in that year. In 1890, they reduced the price another 1d.; increasing the receipts by £1600, and bringing them up to £59,339. In 1891, they jumped up by £3000; in 1892, by £3700. In 1893, however, they were all but stationary in their gross receipts; that being the strike year. In 1894, they rose from £65,000 to £75,000; but this included £5000 for Carshalton. What, he asked, was the use of talking of this being a risky business? It was as secure and reliable as anything could be; and there were very few traders but would be only too glad to be making such profits. The Croydon Company had been so successful under the sliding scale that they were actually dividing on each class of their capital 4 per cent. more than they would have been entitled to do under the old scale when they were compelled to reduce the price of gas, keeping under the standard price, instead as now under the initial price. It ought to be looked upon as a safe, secure, profitable, and prosperous business, that could bear to pay a large rent to the landlord; and the amount of rent to be so paid, subject to statutory deductions, was the question which had to be decided by the Court. There was scarcely another instance where the landlord would expect to find a larger interest for his capital. The only test of the value of the property was what, considering its history and its prospects, a tenant would be willing to pay for it. The other side said that, notwithstanding the history of the Company for the past fourteen years, the tenant would not be willing to pay to the landlord more than Mr. Woodall's figure of £13,378, though in 1883 the sum was fixed by agreement at £10,180. Having dealt with a number of other statistics, Counsel contended that a business such as that of the Croydon Gas Company could get any number of tenants who would be perfectly contented if they could secure 15 per cent. all round to cover risks and everything else. This was how the respondents dealt with the matter in arriving at their assessment.

At the close of the learned Counsel's address, the further hearing of the appeal was adjourned until the 1st of November; it being intimated that, in the meanwhile, some arrangement might be arrived at which would lead to a settlement of the case.

Assessment of the Australian Gas Company's Mains.

The Australian Gaslight Company recently appealed against an assessment by the Parramatta Borough Council in respect of soil occupied by the Company's mains under the public thoroughfares of the borough. The appeal came before the Parramatta Bench; and it was submitted by the representative of the Council (Mr. J. E. Bowden) that they had no power to deal with it, the question not being one of value, but of the legality of the assessment, and therefore one which should be determined by the Supreme Court. The Bench, however, decided that they had authority to hear the issue as far as the value was concerned. For the Company, Mr. B. R. Wise argued that the mains were not property, and could not be rated, inasmuch as they were under the public streets, which could not be assessed. Under the Municipalities Act, there were but two methods of levying rates—viz., on the capital value or on the annual rental. The capital value of the lands through which the mains ran was *nil*, because they were public streets; and there could not be any rental value, for none was received. Mr. Bowden contended that the pipes used a certain portion of the ground which came under the designation of "lands and hereditaments," as provided to be vested in the 166th section of the Municipalities Act. The Council had nothing to do with the ground—the Company having independent occupation. The Bench held that the mains were not rateable.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held at the Company's Offices, Horseferry Road, Westminster, on Friday last—the GOVERNOR (Colonel W. T. Makins) in the chair.

The SECRETARY and GENERAL MANAGER (Mr. J. W. Field) read the notice calling the meeting; and the report of the Directors, which was given in the JOURNAL last week, with the accounts for the six months ending June 30 last, was taken as read.

The GOVERNOR, in moving the adoption of the report and accounts, said he would only trouble the meeting with a few comments, in addition to what had been set forth in the report itself. If they turned to the capital expenditure account, they would find that during the half year there had been expended £83,116. The principal items were for purifying-houses, purifiers, and stoking machinery at Beckton, which amounted to £16,500. The tar and alkali works, the cyanogen works, and other chemical plant, amounted to £5000; and pipe-laying to £8200. And then came the larger figures in the capital outlay, which were about £34,900 for meters. This item included a large number of automatic meters. Then came £24,700 for stoves—which also included automatic stoves. The Kensington show-room—the Company's new premises in High Street, Kensington—had cost the Company, to fit and furnish, £2650. He looked upon this as a really substantial and profitable outlay for the Company. Ever since they had had these premises, they had been able to get their money in much better, as it was in a more easily accessible position; and they had also been able to sell a great many more stoves, because they had them arranged for lighting up on the premises, so that everybody who desired to see what a stove could do, could see it at work, order it, and have it sent home at once The only other item was buildings and machinery, which came to £4296; these items making together £96,245. Off that, however, had to be taken: For depreciation of meters, £4775; and for stove depreciation, £8355—making together £13,130, and leaving, as he had said, a net capital outlay for the half year of £83,116. The very large amount of £60,000 for stoves and meters, the meeting would agree, was a very satisfactory feature, because it pointed to an increase in the Company's business, in regard to both lighting and heating. Now £48,000 of this amount represented the capital expended during the present year on stoves and meters; but, in addition to that, there was a sum of nearly £50,000, which had been charged to revenue. This did not properly form a capital charge; but, as it was too large an amount to take out of the revenue of one half year for an installation like that of the automatic meters, it would be carried to a suspense account, and a proportion of it would be charged for several half years till the whole was liquidated. Another very satisfactory item in the accounts was the amount of capital per ton. He was glad to say that the capital expenditure for the half year, per ton of coal carbonized, stood at £5 19s. 1d., as against £6 5s. 7d. in the corresponding period of last year. As the works and plant of the Company were now sufficient to do a great deal more business than they were doing, he thought, with the continual increase, they might look forward to this figure being likely to be still further reduced. It was not contemplated to call up any capital during the present half year. In regard to the gas-rental, the quantity of gas sold during the half year was 9841 million cubic feet, as against 9227 millions in the six months ending June, 1894. The increased quantity—614 millions—at the price charged in June, 1894, before they made their last reduction, would have yielded an additional rental of £92,379. But the 3d. reduction in price, which had taken place last year, had given the consumers an abatement of £109,553 in their gas bills; and this had converted the addition of £92,379 into a reduction of only £17,174. During the present half year, this £17,174 was all that had fallen upon the rental in consequence of the reduction—it was all that they had suffered in regard to rentals. Then the rate of increase, which was stated in the report as 6⅔ per cent., was, as the proprietors would naturally imagine, mainly the result of the severe Arctic weather which prevailed in the later months of last winter—March, February, and the end of January. But he was happy to say that, though they had, for the half year, this increase of 6⅔ per cent., due mainly to exceptional causes, the increase still continued; and for the month of July, which was just concluded, the augmentation in the sale of gas amounted to more than 4½—nearly 4⅔—per cent. No doubt the attention of the proprietors had been called to the extension of the incandescent gas-light. Many people had rather condoled with him, saying that it must be a very bad thing for the Company, because the incandescent burners consumed so much less gas than the ordinary flat-flame and Argand burners. But in a district like theirs, which had been more or less laid hold of by the electric light, the substitution of incandescent burners for electric lighting, which was largely taking place, and the increase in the consumption of gas through the introduction of incandescent burners themselves, showed that the incandescent light was really a good friend of, and not an enemy to, the Company; and they hoped to see the number of incandescent burners largely increased. They trusted the County Council would make some experiments in street lighting with these burners before they committed the public to the very large expense which would be involved by the introduction of electricity instead of gas on the Embankment. This would amount to some £16,000; and the annual outlay would be about three times as much as they paid for gas. If they were to adopt incandescent lighting, he was quite certain they would have a much more brilliant light; and it would cost them no more, if not something less. Another feature of the past half year had been the abolition of meter-rents. He thought the Directors had been fully justified in that policy. It had been a further benefit to the consumers during the past year to the extent of £29,000. So that, together with the reduction in the price of gas, the consumers in the North of London were

obtaining gas at a total reduction of 3·76d. per 1000 cubic feet, compared with the June half of last year. The abolition of meter-rents, as the proprietors were aware, only affected the district outside the City, as they had no meter-rents in the City prior to their abolition elsewhere. Then with regard to the question of price, the way in which it affected the public might be shortly stated as follows: During the past twelve months, the Company had made remissions to the consumers of 3d. per 1000 cubic feet on the private lighting north of the Thames, which amounted to £210,000 per annum; they had also made a remission of meter-rental, which amounted for the year to £58,500—making a total of £268,500 per annum. The little addition to the dividend only amounted to £42,300; and the addition, after remitting to the public this £268,500, and paying the proprietors an extra ¾ per cent., would leave a small addition of £20,100 to be carried to the reserve fund. This showed that they had not been moving too fast. At the same time, he hoped the proprietors would agree with him that it was most undesirable to move too quickly in the reduction of prices. They had burned their fingers over this before. It was so much easier to knock down a penny than to put up a penny; and the policy he advocated would be to have a strong, safe fund at their backs, to provide for a reduction of profit, before they entered on any reduction in price. He did not mean to say that any further reduction was very remote. He hoped it might come; but he distinctly declined to promise any further reduction at present. They certainly would not make any reduction until they were convinced that their funds would amply suffice to bear it. With regard to coke, though the price had been somewhat low during the past three months, it was very satisfactory to find that the saving in the fuel account had yielded such an increased revenue as to be more than sufficient to meet the slight loss on the price obtained for coke. This, of course, pointed to good working in the retort-house. For this they were indebted to their Engineers, as they were for much more of their good fortune, for their assiduity and zeal. He thought this tribute was due to the Engineers; and he was quite sure the shareholders would endorse it. They were in rather an awkward position with regard to their coke, as they were not so well situated as other companies were in being able to dispose of it. The bulk of their coke was taken down the river, and had to be sold to the cement manufacturers. This placed the Company, to a certain extent, at a disadvantage; and the recent depression in the cement trade had, no doubt, contributed to keeping the price of coke low. He was happy to see, from a document recently issued by the largest cement manufacturers in their district, that there was now a considerable increase in the hopes of their trade, and at the same time they were able to secure higher and better prices. This being so, he was quite sure that the depreciation in the sale of their coke was not likely to be very long and very pronounced. Tar products had not only brought in an increased revenue, but the yield per gallon was well above the average for 1894. The exact price which had been realized per gallon of tar had been 1·95d., or as nearly as possible 2d., per gallon. This would compare favourably with the price obtained generally in the market. With regard to sulphate of ammonia, the market had been abnormally dull and lifeless. This, as the proprietors were aware, arose from the bad agricultural season of last year, and the late sowing season of this year, which put it entirely out of the power of the farmers to sell their corn, and to spend a portion of the proceeds in artificial manures. The same cause had acted very unfavourably on the traffics of the railway companies. All the feeding-stuff grown on the land, with the exception, perhaps, of barley, which was used in malting, had been consumed at home; and the same cause had affected the sulphate market. They had, of course, a considerable stock; and their policy had been not to sacrifice it by forced sales at a low price (because the pouring of a large amount on the market would tend to depress the price), but to value it in their books at a lower amount than the ruling market price, and to wait for better times. He was quite sure that, as a general commercial policy, this was the proper one to pursue under the circumstances. If they had a good harvest this year, they might look forward to a good demand for artificial manures during the coming autumn and winter. He would next turn to the expenditure side of the account, from which it would be seen that, as to coals, they had expended £82,600 more than in the half year ending June, 1894. Of this amount, £52,900 arose from the increased price the Company had had to pay—viz., about 1s. per ton. The contracts just completed would have the effect of relieving the Company of this extra charge for the current twelve months; and he sincerely hoped—and he had no doubt others engaged in the gas industry would agree with him—that they would not have in the future such serious fluctuations in the price of coal. A steady and reasonable price was far better for their requirements, and he believed far better for the coal owners and producers, than a constantly fluctuating price. He did not often prophesy, but he did two years ago, that the coal combination, from which they had long suffered a considerable rise in the price of coal, would not, in the long run, effect any good. This prophesy had been fully justified, because at the present moment the Coalowners' Combination, if it had not ceased to exist, at any rate had ceased to extend any practical influence in any part. Artificial methods of raising prices against the consumer were bound to end in failure. On the labour account, there had been a small saving, which had arisen partly from the increase in the quantity of gas made, and partly from extension of mechanical stoking appliances. He would say, in regard to the stoking, that the men throughout the Company's stations were working exceedingly well. There was no fault to be found with them, and nothing but praise to give. This was evidenced by the larger make of gas per ton of coal, which, if there had been negligence or bad work, would not have been increased. He himself believed that the men were now beginning to appreciate their position in the Company's service. This was as it ought to be; because everything that could be done for their comfort and benefit, which the Directors were entitled to do as trustees for the shareholders, and as prudent managers of a public company, was done by the Board. The men were all paid good wages, and were well cared for in every way. Their benevolent fund, to which the shareholders subscribed annually £3000 or £4000, enabled them to lie by in time of sickness or accident; and when they arrived at the age of 65, or thereabout, if they had a good record, they were allowed to retire on such a pension—which was governed, of course, by the length of their service under the Company—as enabled them to pass their old age in comfort. All these things, taken together, were better than the flatulent promises of agitators; and their workmen, with that common-sense which characterized all English workmen, had begun to see it. He thought they had, at any rate in the immediate future, little to fear from agitating raids such as had been carried on in the past. It was some little comfort to see what had taken place in the country at large lately—that those who were, from a gas point of view only, termed by him the "common enemy," had fared very badly. Their friends Mr. Rowlands and Mr. Naoroji were "out in the cold." They were very sorry for them; but they were very glad for themselves. The item of wages, as would be seen from the accounts, was now divided into two parts—showing, first, the total cost in labour for carbonization, which amounted to 3s. 1½d. per ton of coal; and, secondly, the wages paid to the watchmen, valve men, and others engaged in the Company's works. The amount of these wages had hitherto been lumped together. This was done in accordance with the requirements, or the desire, or the suggestion, of the late Mr. Parkes, who was the Official Auditor. But it was not quite clear that this division was observed generally; and, therefore, they had thought it better to show clearly what was due to carbonization itself, and what was due to miscellaneous services. It was a method that cleared the accounts—at any rate, it did not confuse them. With regard to the wear and tear in manufacture, this was less than in the corresponding half of last year. In that period, some very heavy expenses were incurred for the reconstruction of purifiers. The lateness of the winter this year had prevented their Engineers getting on as fast as possible with the ordinary repairs. Therefore, for the current half, this item might possibly be somewhat heavier. He was sure the shareholders would support the Directors in their determination not, for the sake of fractionally reducing the price of gas, or selling it at a cheaper rate, to neglect keeping the works in a proper state of efficiency out of the revenue for the year. This had been their policy; and they intended to stick to it. He only mentioned this because it was somewhat unusual that the amount should be so low at this time of the year. The expenditure on distribution during the half year showed an increase of £20,545, mainly caused by the fitting up of small dwellings with automatic meters and gas stoves and fittings. The initial outlay was too large to be charged to any one half year; and the part that belonged to revenue would be carried to a suspense account. With regard to the automatic meters, as far as they could they had followed the lead of Mr. Livesey, who made such a grand *coup* with this trade two years ago. This only applied to a part of their district, because it was only in the north and east that they did this trade; and it had been extended very rapidly indeed. The number of meters had increased during the year by 7108; and the lights, by 56,152. Up to that day, they had 13,429 automatic meters; and the trade was only begun within the last ten or twelve months. On their books, beyond what had been already fixed, they had some 6000 people waiting to be supplied. The arrangements that had been made by Mr. Foulger, their Distributing Engineer, were such that in a short time they would be able to supply all the requirements without any delay whatever. He thought they might look to the extension of the automatic meter system to broaden the basis of their operations, and to give a continuous consumption, which, though it might not be so profitable as private lighting, would tend to lighten their load factor by keeping it in operation. With regard to the extension of gas appliances for cooking, he might mention something he heard a few days previously in connection with another industry, and that was that there were great complaints from the bakers in the East-end of London, who had been in the habit of baking artizans' dinners. Now they said they did not use so much coal, because they had not so much baking to do; and they explained that the reason of this was that so many people now did their baking at home. This was not only a straw that showed which way the wind blew, but it also showed it was blowing in the right direction. The other extra cost of distribution arose from the severe frost. The additional cost to the Company on that account was something like £7000; and it represented a sensible reduction from the extra amount of gas sold in consequence of the severity of the weather. While they regretted the inconvenience caused to the consumers by the accumulations of naphthalene with which it was absolutely impossible, with their staff, to cope all at once, because they were abnormal in number, the Company's outdoor men did the very best they could. They exerted themselves to the utmost of their ability; and the consumers, even those who at first were very angry, wrote to express their satisfaction with the way in which the difficulties had been met by the Company's officers, and the courteous way in which they had relieved them from their troubles. As he had said a word in praise of the Engineers, he thought the outdoor men were equally to be praised and thanked for the way in which they had met this difficulty. The next item was that of rates. The Company were long suffering on that point. The increase amounted to nearly £8000; and it was mainly the result of the ever-increasing amount of the rate in the pound. It would be remembered that this time last year they had to complain of an addition of 2¼d. in the pound in the rates. This year they had a further addition of 4¾d. The rate last June was 5s. 10¾d. in the pound. For the last half year it was 6s. 3½d.; and, as far as could be seen, there was no sign of any abatement. On the contrary, the School Board were going to put on another penny, and the County Council another penny. There would consequently be no reduction on that head; and they would have to be prepared to face an increase. This extra penny of the School Board and of the County Council would amount to £25,000 to be contributed by the Company yearly. As he had said before—and he did not think he could repeat it too often—the public burdens imposed on the Company in the way of rates by the Local Authorities, caused the consumers to pay 2½d. per 1000 cubic feet more than they would have to pay if those burdens were not so imposed. That was to say, 2½d. paid for gas went in the shape of rates. His friend Sir Arthur Arnold, the able Chairman of the London County Council, made some very pertinent remarks the other day in his annual address to that body; and they were so important that the

meeting would forgive him if he quoted them *verbatim*. Sir Arthur said, referring to the work of the County Council:

In regard to finance, the practice of Imperial and of local government is somewhat opposed. In the former, the general rule is to allow expenditure to be controlled by revenue; in the latter, the general rule is to make income to be controlled by outlay. The Treasury often meets applications from departments of State with refusal on account of insufficient revenue; and the disappointed Minister has no appeal save in or to the Cabinet. But, speaking roundly of our system, we make a grand total of our estimated expenditure, and then proceed to levy the necessary rate. I do not propose that we should abandon that system; but I am sure the Council will gladly learn that our Finance Committee are considering proposals for more careful observation, and for closer control of our expenditure. We vote our annual estimates *en bloc*. It may be better that we should take those of each Committee separately. In principle, the control of our Finance Committee resembles that of the Treasury; in practice, the Council vote considerable sums for estimates before the figures have been considered by the Finance Committee, and subject to the formality of an estimate being presented by the Committee in accordance with law.

He was very glad to hear Sir Arthur Arnold say that they were going to reconsider this system, for a more rotten, a more hopeless, he might almost say a more wicked system of finance, more tending to extravagance and leakage, could not possibly be devised. It was very small wonder that the rates were increasing, if this was the system on which the public money was dealt with by the municipal authorities. If it were to be adopted in their Company, the dividend would soon decrease, if not disappear. During the year, there had been a very satisfactory reduction in the cost of parliamentary charges. There had been no oppositions to make, nor any Bills to promote; so that this item was very much smaller. The result of all this was that the net revenue for the half year came to £361,516. Of this, £1546 was added to the undivided profit from 1894, which was £255,254. This made together £256,800, which, with the amount of the reserve fund—£127,344—came to £384,144. The reserve fund, as he said at the commencement of his speech, was a guarantee against any fluctuation in the dividend, and a guarantee for the maintenance of it at its present rate, and also a fund which, as it grew, would enable them further to reduce the price of gas. The question of the photometric standards had been dealt with in the report; and he did not know that he need add anything to what was stated there, except an assurance that the Board would watch very carefully any legislation which might be the outcome of that report, which mainly dealt with the substitution of the pentane burner for the ordinary candle in testing gas. This was a very important matter. But it was not everything; and when that step was taken, it would only be the first one towards placing the testing of the Company's gas on a basis which would be alike fair to the consumer and to the Company. He did not wish them to be unduly elated. No doubt, as he said a year ago, they had turned the corner; and he hoped they would keep on the right side of it. The Company's operations were satisfactory in every particular. They would look in due course to a further reduction in the price of gas; and, in the meantime, they would endeavour to conserve their interests in the same way as they had hitherto done. He hoped the report which had been presented this half year, and the very satisfactory price at which the Company's stock stood in the market, would cause the shareholders to think that the Directors' endeavours in the past half year had not been in vain.

The DEPUTY-GOVERNOR (Mr. H. C. Ward) seconded the motion.

Dr. WILD wished to congratulate the Board upon the splendid report they had presented. The Governor had mentioned, in his remarks, that the County Council had been appealed to to test the incandescent gas-light on the Embankment. His experience was that they had difficulties with bodies of that character; for some years ago he attempted to induce the Kensington Vestry to test their gas on the best possible principles, but his motion was rejected. With reference to the question of lighting the Embankment, unless the Board bestirred themselves actively, they would find the same result. The electrical influence was very powerful. It was well known that the great weakness of the incandescent light was the fragile nature of the mantles; and if they had such a light on the Embankment, no doubt the heavy waggons passing along, creating very perceptible vibration, might often be sufficient to fracture them. He would therefore suggest to the Company that they should take the matter in hand, and see whether they could not reduce the vibration to a minimum. There was one other question he should like to ask, and that was whether the Engineers had made any experiments with fine platinum gauze for the incandescent lights. This gauze would not be very expensive, if it were made very fine; and it would be very enduring. If they demonstrated that there could be produced a mantle that was indestructible, the incandescent light would take enormous hold.

Mr. FRAZER said he had followed with much interest the incandescent light at Brighton, where they had an embankment on rather a large scale. The Brighton and Hove Gas Company had asked permission to put up some incandescent lights. A certain number had been erected; and the success was as near perfect as could be. He was applied to by the Hove Commissioners, who talked of extending the electric light; but he told them not to do anything of the kind until they had seen the result of the experiments of the Gas Company. The outcome had been that the whole of the remainder of the lighting was to be on the incandescent system, which he thought put the electric light in the shade. Decidedly the reports brought home by the sailing vessels and fishermen were that these lights were easily to be distinguished, and gave a better effect than the electric light which was alongside them. He agreed with the Governor that the incandescent light was one of their best friends; and it would check the enemy—the electric light—to a very considerable extent.

The GOVERNOR, in reply, said he quite agreed with Dr. Wild that the experiment he referred to ought to be tried; and he understood that it would be tried, and probably by the London County Council. The Company had already shown what could be done with gas; but he thought if they took up the question of burners they would be travelling out of their sphere. There were so many competing burners that they sedulously avoided favouring any particular form, or any special kind of light. With reference to what had been said about vibration being a great drawback, he understood that there had been invented a spring which held the mantle (which was now a very much tougher article than it used to be) in suspension in such a way that vibration did not injure it. He had no doubt the lights which Mr. Frazer referred to, at Hove, were held by a spring.

Mr. FRAZER said he believed they were.

The GOVERNOR then put the motion, and it was carried unanimously.

The resolution approving of the dividend was next put, and was also unanimously passed.

A cordial vote of thanks to the Governor for presiding closed the proceedings.

SOUTH METROPOLITAN GAS COMPANY.

The Directors' Half-Yearly Report.

The following is the report of the Directors of the above Company for the half year ending June 30 last, which, with the accounts for that period (to be given next week), will be presented at the general meeting of the Company on the 14th inst.:—

In accordance with their policy to reduce the price of gas whenever they can safely do so, the Directors have the pleasure to announce that from the Midsummer quarter it has been reduced 1d., to 2s. 3d. per 1000 cubic feet. This reduction will benefit the consumers to the extent of £29,000 a year.

They regret, however, to state that the present very low prices of coke and ammonia (the latter never having been so low) will in the ensuing half year cause a considerable reduction of revenue. The price of coal has fallen to the figure of 1893; but this saving will meet only a portion of the loss on coke and ammonia.

The favourable state of the accounts for the half year is due mainly to a very exceptional increase, at the rate of 13 per cent., in the consumption of gas over the corresponding period, or about three times the average increase, in consequence of the prolonged and severe frost in January and February. On the other hand, the exceptional expenses occasioned by the frost amount to upwards of £7000.

The number of consumers continues to increase. The "penny-in-the-slot" or automatic meters fully maintain their popularity—6817 having been fixed in the half year; bringing up the total number in use on the 30th of June to 32,333.

The Directors propose to continue the policy, repeatedly approved by the proprietors, of building up the reserve and insurance funds, which were almost entirely absorbed by the losses sustained in the years 1889 to 1892. In reference to the insurance fund, the Official Auditor required its restoration as soon as possible. The profit is sufficient to pay, and the Directors recommend the payment of, the usual nominal dividend of 13 per cent., to be apportioned in accordance with the Scheme of Amalgamation, except £500 due to the "A" stock to be added to the reserve fund, together with the odd ½ per cent. of dividend to which the shareholders are entitled under the sliding-scale. This will increase the reserve fund by £5896 14s. 3d., to £73,611 14s. 4d.; the insurance fund by £5396 14s. 3d., to £42,184 2s. 8d.; and the undivided balance by £6187 3s. 10d., to £34,473 18s. 5d.

The Committee of the House of Commons having refused to sanction the conversion of the Company's stock from a nominal 10 per cent. into double the amount of 5 per cent. stock, the Board thereupon withdrew the Bill. In these circumstances, the Directors desire the opinion of the proprietors as to the expediency of re-introducing the Bill next session.

The Directors have again to express their satisfaction with the good and loyal spirit that animates their officers and workmen.

BRENTFORD GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Friday, at the Charing Cross Hotel—Mr. HOWARD C. WARD in the chair.

The SECRETARY (Mr. W. Croxford) read the notice convening the meeting; and the Directors' report and accounts, of which an epitome was published last week, were taken as read.

The CHAIRMAN said the report and accounts which the Directors had to produce that day were such as the shareholders ought to be very satisfied with; and for this reason especially: Comparing the past half year with the corresponding period of 1894, when the price of gas was 4d. per 1000 cubic feet dearer, the Directors were enabled, notwithstanding this reduction (which amounted for the half year to the sum of £8000), to increase the dividend by ½ per cent., and to commence the formation of a reserve fund, which he believed would be of great service to the Company. In addition to this, they would carry forward a sum of £37,273, as against £29,367. The dividends recommended were at the rate of 5 per cent. per annum on the 5 per cent. preference shares, of 12 per cent. on the consolidated stock, and of 9 per cent. on the new 1881 stock. With reference to the proposed reserve fund, the Company had never had such a fund. He had been a Director of the Company 44 years; so that he knew something about this matter. Their capital, as compared with the business done, was very large in the old days; but it had been going down from time to time. The Directors had thought it very good policy to hold as large a sum as they could in undivided profits, in order that they might not unduly increase the capital per ton of coal carbonized. The capital per ton had been going down to a considerable extent. It now amounted to £6 13s. 4d.; while ten years ago, it was £8 1s. 6d. Such a heavy load factor as £8 1s. 6d. per ton, made a great deal of difference to the way they were able to conduct the business, and the price they charged the consumers. The Directors' report referred to the progress of the inclined retort system at the Southall and Brentford works. The Company were the pioneers of inclined retorts in England. A great controversy had been going on as to who first introduced them; they had been so successful that people in all directions wanted to claim the credit of having introduced them. He would tell the shareholders a simple, unvarnished tale respecting this matter. Their Engineer (Mr. Frank Morris) said to him and the other Directors one day in 1890: "I have heard that in one town in

France—a town of great historic interest, but not a large town—they have a system of carbonizing by inclined retorts." Now this happened at the time when they were much worried with labour; and, of course, they were casting about to see how the labour trouble was to be met. He (the Chairman) always said the mechanical engineer would be too great for the labour agitator. With the consent of his colleagues, he told Mr. Morris to start at once for Rheims. He went, and came back with the drawings showing the operation of these retorts. They then put some up at Southall; and these were the first inclined retorts that were erected anywhere in England. They had been improved from time to time, until they had been brought (mainly by Mr. Morris and his assistants) to what he might say was almost absolute perfection. The Directors had lately had the pleasure of seeing these retorts at work. He (the Chairman) was an old gas hand; and he had never witnessed anything working more beautifully than the way these retorts were charged and discharged. They were now completing a new house on this system at Southall; and one of the other houses at Brentford was being converted from horizontal to inclined retorts. He mentioned these things because people had almost tried to take away from their Engineer and officials the credit of the introduction of this system. It belonged to them, and to them alone. Their half-year's business had been very good indeed. The sale of gas had increased by 11½ per cent. This was mainly due to the severe weather at the beginning of the year; but although there was this great increase in consumption by reason of the cold, it must be remembered that it was not all gold that glittered, and that the increase was not earned for nothing. The Company had considerable coal storage at Brentford and Southall; but with the quantity of coal they were consuming week after week, it was necessary that it should be added to almost, he might say, daily. But during the frost, the river was stopped for five weeks; and the canal at Southall for about six weeks. They could get into the Southall works by railway, because they had a siding in connection with the Great Western Railway; but for the Brentford works, they were obliged to cart a large quantity of coal from the Kew Bridge Station. This had caused an increase of 3d. or 4d. per ton in the cost of the coal used in the half year. Adding this to the additional price they had had to pay under their contract, made the cost of the coal 13s. 4d. as against 11s. 11d. per ton in the corresponding period of 1894. Besides this, they had suffered considerably from breakages of mains and services through the frost. Looking at the revenue account, it would be seen that the repair, maintenance, and renewal of mains and service-pipes had increased by nearly 50 per cent.—from £2310 to £3447. There was another feature in the accounts to which allusion had been made by the JOURNAL OF GAS LIGHTING, and that was the great advance in the rental of meters and stoves, which meant a large augmentation of business. In the June half of last year, the rental for meters and stoves amounted to £4100; while it was now £4908. A large portion of this was due to the meters and stoves they had fixed on the prepayment system. The number of ordinary meters fixed on June 30, 1894, was 16,567; and on June 30 last, 16,770—the year's increase being 203. This was about the normal rate. The automatic meters fixed on Dec. 31, 1894, numbered 2837; on June 30 last, 3887, or 1050 more. The increase of ordinary stoves was 508; but the stoves used with the automatic meters, which numbered 855 a year ago, had gone up to 2742. The result of the whole business of the half year was this—that they made the dividend, and carried over the sum of £37,273. They had had however, one or two things to regret. One was the illness—he hoped only the temporary illness—of their colleague, Mr. J. Orwell Phillips, who, he was pleased to say, was now a little better. They had also lost their valued and respected friend, Sir Hugh E. Adair, who was a man of very great practical experience, and had had an extensive parliamentary experience. He had now arrived at the age of 78 or 79 years; and he thought the time had come when he ought to retire. Regarding the vacancy on the Board, the Directors had considered (without any special desire being expressed on the part of Sir Hugh) that it would be to the advantage of the Company—he being a large shareholder—for Mr. R. S. Adair to be placed in his father's position. The Chairman then moved the adoption of the Directors' reports and accounts.

Sir R. H. WYATT seconded the motion.

The CHAIRMAN, in replying to questions, said they charged depreciation upon gas-stoves very liberally every half year. [The ENGINEER: 15 per cent.] The badness of trade, coke and ammoniacal liquor being cheap, and, worse than all, the local authorities threatening the Company with higher rating on the quinquennial assessments, prevented the Company reducing the price of gas so frequently as they would do otherwise.

The motion was unanimously carried.

Resolutions were then passed, declaring the dividends recommended, and placing to the reserve fund account £1475, being a sum equal to ½ per cent. per annum in respect of dividends on the consolidated and new stocks for the half year ending June 30.

A vote of thanks to the Chairman and Directors and the officers terminated the meeting.

INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

The Annual General Meeting of this Company was held last Wednesday, at the Offices, Palmer Street, Westminster—Major-General BERESFORD in the chair.

The SECRETARY (Mr. L. de Fonblanque) read the notice calling the meeting; and the Directors' report and the statement of accounts, which were summarized last week, were then submitted.

The CHAIRMAN said the report and accounts told their own story; and he did not think there was any necessity for him to take up time by explaining what, he hoped, all the shareholders understood. A business the turnover of which increased fifteen-fold in two years was not one that they came across every day. That this rate of progression would be maintained, could scarcely be expected; but they could confidently anticipate that next year's business would be as much in advance of this year's as this year's business was of last year's. The trade they were doing this summer all pointed that way; and the Company were now opening up in street lighting a field which practically they had not touched hitherto. When they considered the conditions of lighting in this country, the enormous consumption of gas, and the large number of the class of the population who were in a position, and would have the inclination, to improve their lighting system, the possibilities of the trade the Company could do were almost boundless. There was absolutely no exaggeration in saying that, as yet, they had not touched the outside fringe of the business lying before them. It rested pretty much with themselves as to whether they were to make this business one of the largest, soundest, and most flourishing corporations in the kingdom. To do this, however, they must pull together amicably. It was a matter of congratulation to all, he thought, that recent internal litigation had been put a stop to. Good sometimes came out of evil; and, in this case, the formation of the English Incandescent Gas Share Company was, he considered, an advantage, and gave strength and stability to the concern. No less than 97 per cent. of the old shares had been exchanged; but the Directors hoped that all the shareholders would have applied to have their shares exchanged for those in the new Company. It was somewhat astonishing that any of the shareholders should refrain from doing what was so manifestly to their advantage. The new Company had every prospect of obtaining a Stock Exchange quotation; so that the new shares would be readily marketable, whereas the small number of shares in the old Company would be practically unsaleable. He hoped even now that a large number of those who had stood aloof would come in. The shareholders were doubtless aware that litigation was pending with respect to certain other incandescent gas-light burners which had been brought out, and which the Directors considered constituted infringements of the Company's patents. They had every confidence that these lawsuits would be brought to a satisfactory termination; and they hoped the shareholders would not allow themselves to be alarmed when they heard of such litigation. It was the penalty of success; and it was not surprising that such an unprecedented success as this business had been should tempt others to follow in their footsteps. Putting aside, however, the whole question of patents, what the Directors wished the shareholders to understand was that, the business being on such a sound basis, the manufacture had, by close attention to detail, been brought so near perfection that even when the time came when the patents lapsed (and this was a long way off), they would still be in a far better position than any new Company or firm. It was really only those who had full experience of this industry who could appreciate the many difficulties which occurred in the manufacture. The difficulties arose at every point; and it was only a long experience, and the education which was only to be gained in having followed the evolution of incandescent gas lighting from its embryo state, that could successfully meet and overcome such difficulties. The very failures they had had in the past had been their most valuable lessons. It was their principle to give the public the best they could supply; and as long as they did this, they would maintain their position. The Company would have no difficulty whatever in selling a burner at less than half the price they now charged if they were content to supply mantles and burners of inferior quality. But such a policy would be, in the long run, ruinous. As shown in the balance-sheet, there was a total profit of more than £90,000 for the past year. This, after payment of the commission due to the Manager and Chemist, was reduced to about £70,000, the whole of which could have been applied to the payment of dividend. The Directors, however, did not think it would be wise to divide the whole of it; and they recommended the writing off of the £4330 of preliminary expenses incurred in establishing agencies, and the carrying forward of £14,455 to next year's accounts. In this sum was included the reserve for paying off the debentures; 25 per cent. having been put aside every year. After referring to the increased responsibilities and duties of the Board, and the nomination of Mr. F. Williams and Colonel E. P. Pigott as Directors (the former of whom was one of the original Directors, and the latter one of the Directors of the Irish Company), the Chairman moved the adoption of the report and accounts.

Major C. JONES seconded the motion, which was carried.

It was then agreed that £51,883 should be applied for the purpose of dividend, free of income-tax, as follows: £5 on each preference share, and 2s. 6d. on each ordinary share.

Resolutions were also passed confirming the appointment of Mr. Julius Moeller as a Director; re-electing Major-General Beresford; and electing Mr. Williams and Colonel Pigott members of the Board. The Auditors were also re-appointed.

English Incandescent Gas Share Company, Limited.

The Statutory General Meeting of this Company was held on the same day. Major-General BERESFORD presided. His speech at the meeting of the parent Company covered to a large extent his remarks at this one. He said that the bulk of the shares of the Incandescent Gas-Light Company had been exchanged for shares in this Company; but all shareholders who had exchanged had ceased to be members of the old Company. Of course, had all the shareholders in the old Company availed themselves of the opportunity of exchanging their shares, that Company would have died a natural death; and the new Company would have been its legal successors. As it was, they were actually the possessors of 97 per cent., or thereabouts, of the earnings and assets. Next year the shareholders of the new Company would participate in the amount of the commission now paid to the Manager (Mr. Julius Moeller); it having been assigned by him to them. The tremendous increase in the business of the Company was being steadily continued; and the sales since March 31 were more than double [The Secretary: Very nearly treble] what they were for the corresponding period of last year. As an example of the wonderful development of this business, it was sufficient to point to the fact that in one summer month they had done as much trade as they did in the whole year ended March, 1893; and the average sales during this summer were about double the winter sales for the year ended March, 1894. He also referred to the considerable additions which the old Company had had to make to their buildings through the development of the business.

A number of questions were asked by Colonel Mundy and others as to financial matters and the relations of the old Company and the new. The Chairman subsequently said it was a curious fact that the bulk of the shareholders in the old Company who had not come into the new were ordinary shareholders, who only obtained 2s. 6d. a share and one-tenth of the profits. The preference shareholders had nearly all come in. There were 105 preference shares and 2287 ordinary shares still standing out, held by 13 preference and 45 ordinary shareholders. There were no resolutions before the meeting; and a vote of thanks to the Chairman and Directors concluded the proceedings.

PROVINCIAL GAS AND WATER COMPANIES.

We commence to-day our usual half-yearly record of the results of the working of Provincial Gas and Water Companies whose reports and accounts are received.

Gas Companies.

The Calverley and Horsforth Gas Company's accounts show that the receipts of the past half year totalled to £4351, of which £3416 was for gas, £899 for residual products, and £35 for sundries. The expenses amounted to £3079; leaving a balance of £1272 to carry to profit and loss account. During the six months, 2662 tons of coal were used. An additional sum of £500 has been borrowed, making the total amount received in shares and loans £37,500.

The Cambridge Gas Company have had a singularly prosperous half year. This prosperity, the Chairman (Mr. Dennis Adams) stated at the recent meeting, had been produced mainly by the long and severe frost of last winter, which caused a great consumption of gas, and necessarily raised the demand for coke, which also brought in a large amount. This great difference enabled the Directors to put by for the reserve fund above £1000; while twelve months ago they had to take out of reserve £2000. Dividends of 10 and 7 per cent. were declared.

The Directors of the Dorchester Gas Company will report, at the meeting of the Company next Tuesday, an increase in the consumption of gas to the extent of 1,179,800 cubic feet in the six months ending June 30; the greater part being due to the severe weather experienced in the early part of this period. The total revenue was £3229; the expenditure, £2199—leaving a profit of £1030. The amount available for division is £1132, out of which the Directors recommend the payment of dividends at the rates of 10 and 6 per cent. per annum (the former free of, and the latter less, income-tax); and the carrying of £20 to the credit of the reserve fund.

The Marlow Gaslight Company, at their annual meeting on the 22nd ult., declared a dividend of 6 per cent. The shareholders afterwards held an extraordinary general meeting to consider a proposal to reconstruct the Company. The Directors had decided that it would be advisable for the Company to undertake the management of the works, instead of leasing them; and they recommended that fresh capital should be raised to carry out necessary improvements and alterations. Reports were read from authorities on Company Law, and on the management of gas-works; and resolutions were eventually passed appointing Liquidators. The new Company will be formed forthwith, under the same Board of Directors.

The York United Gaslight Company show a balance on the past half-year's revenue account amounting to £7516. Of this sum, £338 has been paid for interest upon money borrowed on mortgage; leaving £7177 available for the half-year's dividend, amounting to £7000. The Directors recommend that the usual rate of dividend be declared of 5s. per share. They regard the financial result of the half-year's working as satisfactory, and especially so when it is remembered that the period named has had to carry the recent reduction of 2d. per 1000 cubic feet in the price of gas, bringing the minimum charge to 1s. 10d. The Directors have recently concluded their principal coal contract for next year's supply at a reduction upon the prices paid under the contracts now running. Their anticipation of better trade to improve the value of the residual products has not yet been realized. Tar, one of the most sensitive products to the fluctuations of trade, has barely altered in price; while the value of sulphate of ammonia has been exceptionally low during the whole of the six months. The consumption of gas has been well maintained; the return for the half year showing an increase of 4 per cent. over the corresponding period of 1894. The report announces the death of the Vice-Chairman (Mr. Wilberforce), and the election to the vacancy of Mr. L. Foster.

Water Companies.

At the meeting of the Pontypridd Water Company last Tuesday, references were made to the difficulties encountered during the past half year owing to the very severe frost, followed immediately by a most exceptional drought, which largely affected the revenue account, and seriously taxed the resources of the Company. At the present time, however, all the reservoirs are overflowing. Allegations having been made by the local Council that the leakages are not followed up with sufficient rigour, it was mentioned that bye-laws of a more stringent character had nearly twelve months ago been formulated by the Directors, with the view of more effectually dealing with offenders wasting water; but owing, it is believed, to the opposition of the local Councils, these bye-laws have not been returned from the Local Government Board.

The rent-roll of the South Hants Water Company has increased during the past half year by £406; and 59 additional houses have been supplied with water. The profit and loss account shows an available balance of £2215, which, but for the unusual frost of last winter, would have been considerably increased. The Directors propose a dividend of 5 and 3½ per cent. on the ordinary and new shares respectively. For the better supply of the Company's extended district, a new reservoir has been completed at Timsbury, and one is in course of construction at Bitterne. At the forthcoming meeting, the proprietors will be asked to authorize the raising of additional capital to the extent of £20,000.

The revenue account balance-sheet of the York Water-Works Company shows on the credit side, including £1964 brought forward from the previous half year, a total sum of £11,864. Deducting from this the payments shown on the debit side, there is a balance of £7292. The severe frost of last winter has heavily increased the expenditure on repairs of mains and works; but although the citizens of York unavoidably suffered some inconveniences through the frost, they happily escaped the more serious misfortunes experienced in many other places. The item of rates and taxes has largely increased; the extra amount debited for the half year being £228. The Directors report that in the last session of the late Parliament the Company's Bill received the Royal Assent. After protracted negotiations with the Corporation, the Bill became an unopposed measure. The Company have now secured powers (*inter alia*) to raise share and loan capital to the extent of £75,000, to create a contingent fund of £10,000, to utilize the land recently acquired, and an extension of their limits of supply. They have also accepted a limitation of back dividends to a period of six years. The interest on the new capital is restricted to 3½ per cent.; but the auction clauses were dispensed with, so that the Directors will be enabled, as occasion arises, to issue the new share capital to the existing shareholders. At the meeting last Thursday, a dividend was declared of 5s. per share on the preference shares, of 10s. on the ordinary shares, and of 7s. on the new shares.

ELECTRIC LIGHTING NOTES.

The Special Lighting Committee of the Liverpool City Council discussed, and put into final form, at their meeting yesterday week, a report upon the negotiations which have resulted in the purchase by the Corporation of the undertaking of the Liverpool Electric Supply Company for a sum of about £400,000. As soon as it is printed, the report is to be circulated for the information of the Council and the ratepayers.

In the Queen's Bench Division of the High Court of Justice, on Monday last week, a special case was before Baron Pollock and Mr. Justice Wright, which raised the short point as to whether a contract for the lighting of the streets of Prescot by electricity was void or not (as construed by the light of the 174th section of the Public Health Act, sub-section 2) by reason of its not containing a pecuniary penalty in respect of the non-performance of any of its conditions. The plaintiffs were the British Insulated Wire Company, Limited; and the defendants, the Prescot District Council. The contract was made in November, 1892; and it was provided that the Company should efficiently light the streets within the district of the Local Board by means of electricity for a period of five years from Jan. 1, 1893. The lamps were to be stationed in the streets as approved by the Board, and were to be laid down and kept in repair at the expense of the Company. One half of the incandescent lamps were to be lit during the hours of darkness all the year round; the other half, to be lit from dusk to midnight from Aug. 25 to May 25 in each year. The arc lamps were to be lit from dusk to midnight; no notice being taken by the Company of moonlight or other causes which would tend to enable them to depart from a fixed course of electric lighting. The Board were to pay £350 a year, payable quarterly, in consideration of such lighting; and the Company were to indemnify them in respect of all actions in regard to the works and the light. The present suit was brought to recover £278, which included three quarterly payments of £87 respectively; and the balance was made up of three sums for extra lamps. The contract was duly executed; and the seal of the Board affixed. These facts were agreed; and the only point between the parties was whether the absence of a penalty clause in the contract vitiated the contract. Counsel for plaintiffs (Mr. Arkle) submitted that the clause in the Act regarding this was merely directory, and did not vitiate the contract. The point, he said, had never been decided before, though it had been raised twice. Without calling on Mr. Danckwerts to reply for the defendants, Baron Pollock said he did not see how the Legislature intended that the question of penalty should be treated as a merely voluntary matter. Sub-section 2 was not merely directory, as it specified that a penalty should be stated in the case of the contract not being performed. Mr. Justice Wright concurred; and judgment was entered for the defendants, with costs.

Last Wednesday's proceedings at the St. Pancras Vestry were exceptionally interesting; the major portion of the sitting being devoted to an animated discussion on a joint recommendation of the Electricity and Highways Committees that the Vestry refuse sanction to the application of the London Hydraulic Power Company to lay pipes to certain premises in the parish for the purpose of working lifts therein. The reason for this proposed action, as set forth in the *agenda*, was that "the Company must be regarded as competitors with the Vestry, inasmuch as the Electricity Department are prepared to supply the necessary power for the purpose required." Not content, therefore, with meeting a legitimate demand for electric lighting, the Committees sought to prevent the employment of a rival motive power to a use for which it is admittedly pre-eminently suited, in order to compel tenants to become customers of the Vestry, or go without the accommodation needed. Naturally the proposal called forth emphatic expressions of dissent; and the sequel affords food for much reflection. Mr. Purchese, the Chairman of the Highways Committee, admitted that seven members were in favour of the recommendation and six against it; that the lifts were already in course of construction; and that the Hydraulic Power Company had agreed not to supply their power for electric lighting purposes. A deputation, consisting of Mr. Saunders, the tenant who had raised the question, Mr. Galloway (representing the landlords of the property), and other ratepayers, were then called in and interrogated. Mr. Saunders said he believed that only hydraulic power was sufficiently strong to lower 25 cwt. safely and efficiently; while he questioned the reliability of electricity—the current, to his personal knowledge, having often failed altogether. On behalf of the landlords, Mr. Galloway said the two motive powers need not come into conflict, for the Vestry could limit the hydraulic system to lift purposes only. The deputation having retired, Mr. Wetenhall moved, as an amendment, that the application be granted, on the condition that the Company do not supply their power for the production of electric current. Mr. Hodgson

seconded the amendment; saying the Vestry might as well prohibit the sale of wood in the parish because fires could be lighted by electricity. Mr. Doll maintained that, if electricity as a motive power was efficient and cheap, there would be no opposition; but it seemed to him that the only advantage in electric lifts was that they used electrical power. How such an unfair and ridiculous proposition came to be put upon the *agenda*, he failed to understand. Here the closure was ineffectually moved; and the debate was continued by Mr. Macgregor, who asked how it was that the City of London Electric Lighting Company used hydraulic lifts, and the General Post Office also, whose Chief Engineer and Electrician was Mr. Preece himself, to whom the Vestry had paid large sums for advice. Mr. Markham objected to the permission being granted, on account of the damage to the roads; and Mr. Barnes agreed with him. At this point the closure was again moved, and lost. Mr. Menzies then defended the Electricity Committee, who had, he thought, acted wisely in bringing the recommendation before the open Vestry, who would be wholly responsible for whatever course was decided upon. Mr. Sweet, the Chairman of the Electricity Committee, said as a principle Free Trade was all right; but it would not apply in particular instances. The recommendation before the Vestry had been framed in the interests of the ratepayers. The current could be supplied at a rate that worked out at ¼d. per ton raised; and it was most economical. Besides, in their own pamphlets, the Hydraulic Power Company stated that "special terms can be given for electric lighting;" and if the Vestry agreed to let them lay the particular hydraulic main in question, the result would eventually be a house-to-house supply of power, to be transformed into electrical energy on the premises. There were a number of electric lifts working satisfactorily in London; and current at 3d. per unit was cheaper than steam. Why, he asked, should not the interests of the parishioners be served, rather than those of a Company? The closure was then carried; and 31 members voted for the amendment, and 27 against it. But as the former number did not constitute a proper majority of those present, a division was claimed. This resulted in a tie—32 to 32. Amidst a scene of great excitement, the Chairman of the Vestry (Mr. J. W. Thornley, J.P.) gave his casting vote against the amendment, which was therefore lost. The original motion was then carried by 34 to 25. A division was demanded, and the motion was carried by 34 votes to 30. If, therefore, any ratepayer of this enlightened parish desires to erect a lift, he must either use the electric current, or provide his own steam-engine.

The Gas and Electricity Committee of the Bradford Corporation have appointed Mr. A. H. Gibbings to succeed Mr. S. W. Baynes as their Electrical Engineer—the last-named gentleman having resigned, in order to take up a similar position under the St. Pancras Vestry.

The Finance Committee of the London County Council have agreed to lend the Electricity Department of the St. Pancras Vestry £56,100 at 2⅞ per cent.

At the meeting of the London County Council last Tuesday, it was resolved that, subject to the Council hereafter giving their written consent, under seal, to the borrowing, and subject to all necessary consents and evidence being furnished to the satisfaction of the Solicitor, the application of the Vestry of Islington for a loan of £51,000 towards defraying the cost of an electric light installation in that parish, be granted, on condition that the loan be taken up at once—interest being charged thereon at the rate of £2 17s. 6d. per cent. per annum—and be repayable in 42 years on the annuity system.

THE LONDON COUNTY COUNCIL AND THE WATER QUESTION.

The Scarcity of Water at the East-End—The Proposed New Sources of Supply for London.

At the Meeting of the London County Council last Tuesday, the portion of the report of the Water Committee containing the recommendation that the Engineer be empowered to expend further money in investigating fresh sources of supply (see *ante*, p. 248) came up for consideration. It gave rise to several questions addressed to Mr. Idris, the Chairman of the Committee, with regard to the position of the water supply in East London.

Mr. M'Kinnon Wood directed attention to a statement issued by the Secretary of the East London Water Company (*ante*, p. 194), practically throwing on the Council the blame of the lack of sufficient supply.

Mr. Idris replied that his attention had been called to the matter; and, in order to give the full facts of the case, he had obtained two reports—one from the Parliamentary Agent of the Council (Mr. H. L. Cripps) and the other from the Engineer (Mr. A. R. Binnie, M.Inst.C.E.). He would read extracts from the former; and the Clerk would read the latter *in extenso*.

In his report, the Parliamentary Agent stated that the suggestion that the Council's opposition in Parliament to the East London Water Company's Bill of 1893 had any relevance to the Company's insufficient supply, was absurd. That Bill sought power for the Company to create a large amount of additional capital in debenture stock, and to impose most onerous and arbitrary conditions on the consumers of water with respect to their service-pipes, cisterns, and fittings. There was no opposition on the part of the Council to the Company making additional works. He personally offered to the Company, under instructions from, and on behalf of, the Council, that their Bill should be allowed to pass unopposed if they would withdraw the clause imposing arbitrary restrictions on the consumers, and limit the amount of capital to what would be necessary for the next two years, which would have carried them well over the time during which the Council would have to consider what steps they would take after the issue of the report of the Royal Commission. This offer, which he personally, on more than one occasion, urged on the Company's Solicitor that they ought to accept, was declined.

The Clerk (Mr. H. De la Hooke) then read the Engineer's report, as follows: "I have been endeavouring to discover, if possible, the cause of the shortness of water in the East-end; and I think that I have detected the cause. I have had tables prepared, founded on the Official Water Examiner's reports, showing the total quantities supplied by the East London Company during the years 1892, 1893, 1894, and the first five months of 1895. During 1892, the average daily supply was at the rate of 43,500,000 gallons; varying from about 41,000,000 gallons in November to 46,500,000 gallons in January. In 1893, the average supply was at the rate of 41,900,000 gallons; varying from 37,500,000 gallons in October to 51,600,000 gallons in January. In 1894, the daily average was 41,400,000 gallons; varying from 37,600,000 gallons in October, when there was shortness of supply, up to (say) 44,000,000 gallons in January. During the first five months of 1895, I find that the average supply has been at the rate of over 53,000,000 gallons a day, varying from 45,000,000 gallons a day in January up to 59,000,000 gallons a day in February. Since then they had drawn during March, 54,400,000 gallons; April, 55,300,000 gallons; and May, 51,162,000 gallons. From this we see that the month of January in the years 1892, 1893, and 1894 was the month during which the heaviest demands were made on the Company. During January, 1895, 45,000,000 gallons were consumed—a not unprecedented amount during that month; but during the months of February, March, April, and May, the quantities supplied to the district have exceeded any previous record. From our inspection of this increase, my belief is that what the Company are now suffering from is not an insufficiency of supply, but that their pipes became so shattered during the frost of February last as to become so leaky that the water is wasted, and does not reach the consumers. The tables show that in no month during the years 1892, 1893, 1894, or 1895 have the Company ever availed themselves to the full extent of their power to draw the water which they have boasted before the Royal Commission, either from the Thames or wells in the Lea Valley. On a previous occasion, I drew attention to the fact that during last year the New River and East London Companies abstracted from the River Lea about 52,750,000 gallons a day. During the present year, the draft from that river by these two Companies has been as follows: January, 59,800,000 gallons; February, 71,900,000 gallons; March, 67,200,000 gallons; April, 69,200,000 gallons; May, 61,000,000 gallons. This is decidedly antagonistic to the reports of both the Royal Commissions—of the Duke of Richmond in 1869, and of Lord Balfour of Burleigh in 1893. As I have pointed out, a large increase of water, amounting to 28 per cent. of that in 1894, or 26 per cent. in excess of the supply during the remarkably dry year of 1893, can only be accounted for by some sudden alteration in the rate of the consumption in the district supplied, or by an enormous amount of leakage."

Mr. Idris replied to further questions, and said he was prepared to have the two reports printed and copies sent to the Company and the members of the Council.

The Council authorized the expenditure of £2500 between the present time and March next, for making further surveys and obtaining the necessary information with regard to a supplementary source of water supply for London, with the following rider, moved by the Earl of Onslow: "It being understood that, in authorizing the expenditure, the Council in no way pledges itself to proceed further in the matter, or further to consider the whole subject."

The Committee presented a report, which was considered as a matter of urgency, to the effect that, having regard to the numerous complaints of defective water supply, especially with respect to the East London Company's area, and the necessity which might arise for dealing with the matter during the recess, they recommended—"That any action which it may be necessary to take in consequence of the present condition of the water supply be referred to the Water Committee and the Public Control Committee, sitting jointly, with power to act during the recess, notwithstanding any resolution of the Council."

Mr. Beachcroft could not see what powers the Committee proposed to exercise. Under the Act of 1852, the Council had no power to take any action in view of the defective supply of water. The course to be adopted was for any twenty aggrieved householders to petition the Local Government Board, who would forthwith have to inquire into the matter.

The recommendation was adopted, with the addition of the words "with regard to meetings during the recess."

After transacting other business, the Council rose for the recess.

A City Electrical Laboratory.—The Commission of Sewers are now in possession of a well-equipped laboratory situated in Basinghall Street, for carrying out the provisions of the Electric Lighting Acts, the rules and requirements of the Board of Trade in regard to meter testing, and the supervision of lines and mains vested in the local authority. Meter testing will be the principal work of the laboratory; and for this purpose complete arrangements have been made.

Sales of Shares.—A number of £10 shares in the *Uxbridge and Hillingdon Gas Company*, carrying a maximum dividend of 7 per cent., have been sold at £14 15s. each; and £10 (10 per cent.) original shares, at £21 2s. 6d.——At Durham, yesterday week, 24 "A" shares in the *Hartlepool Gas and Water Company* were disposed of at prices ranging from £10 12s. 6d. to £11 each; 48 "B" shares, at £10 10s. and £10 11s.; and 24 "C" shares, at from £8 12s. 6d. to £9. On the same occasion, four (1875) shares in the *Weardale and Shildon Water Company* sold at £37 2s. apiece.——At Boston on Tuesday, 74 £25 shares in the *Boston Water Company* realized from £51 15s. to £52 per share; 100 £10 original shares in the *Boston Gas Company* produced £18 10s. and £18 15s.; and 100 new £10 shares in the same Company fetched £15 7s. 6d. to £15 10s.——Shares to the number of 172 in the *Swinton and Mexbro' Gas Company* were sold last Wednesday at Mexbro'. First issue £5 shares obtained purchasers at £9 and £9 5s.; second issue £5 shares realized from £8 17s. 6d. to £9 2s. 6d.; and third issue £5 shares were bought at £7 5s. each.——At Laker's Hotel, Redhill, last Wednesday, Messrs. Lees and Burchell sold by auction shares and stock in the following Gas Companies: 100 fully-paid £5 shares in the *Redhill Gas Company*, for £1206 5s.; 65 shares in the same Company with £3 10s. paid, for £553 2s. 6d.; 10 fully-paid £10 shares in the *Eastbourne Gas Company*, for £237 10s.; £275 of consolidated stock of the *Maidstone Gas Company*, for £660; and £100 of ordinary stock of the *Tunbridge Wells Gas Company*, for £240.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Mr. John S. Gibb, the Treasurer to the Edinburgh and Leith Gas Commission, has prepared his annual abstract of the accounts of the Commission for the past year, a document which, whether it serves a useful purpose or not, must entail an immense amount of labour upon the Treasurer. It appears that, in the manufacturing department, coal cost £90,896; purifying materials, oil, water, &c., £7018; salaries and wages and charges at works, £37,231 (of which workmen's wages amount to £33,146); and repairs and maintenance of works and plant, £8241. In the distribution department, salaries and wages of rental clerks, surveyors, inspector, and fitters amounted to £8806; repairs and maintenance of main and service pipes, to £5066; and repairs and maintenance of meters, to £4439. The Treasurer's department cost £1751; and the collectors', £2998. The general establishment charges amounted to £2461; feu duties and rents, to £250; rates and taxes to £10,017; law and parliamentary expenses, to £733; pensions and allowances, to £750; discounts and abatements, to £3078; bad debts, to £575; and gas used in works and offices, or supplied free of charge, to £1369. The cost of coal was 12s. 10·14d. per ton; 1s. 2·65d. per 1000 cubic feet of gas made; and 1s. 3·87d. per 1000 cubic feet sold. The whole manufacturing charges amounted to £143,388; and they were at the rate of 20s. 3·15d. per ton of coal carbonized, and 1s. 11·10d. per 1000 cubic feet of gas made. The total cost of distribution was £18,313. It was at the rate of 2s. 7·05d. per ton of coal carbonized, and 2·95d. per 1000 cubic feet of gas made. The total management charges amounted to £7211. They were at the rate of 1s. 0·23d. per ton of coal carbonized, and 1·16d. per 1000 cubic feet of gas made. The gross cost of gas made was £185,688; and it was at the rate of 26s. 2·87d. per ton of coal carbonized, and 2s. 5·92d. per 1000 cubic feet of gas made. The receipts for residuals amounted to £26,496, or at the rate of 3s. 8·93d. per ton of coal carbonized, and 4·27d. per 1000 cubic feet of gas made. The net cost of gas was £158,848; being at the rate of 22s. 5·36d. per ton of coal carbonized, and 2s. 1·60d. per 1000 cubic feet of gas made. The total revenue was £218,891, or at the rate of 30s. 11·18d. per ton of coal carbonized, and 2s. 11·27d. per 1000 cubic feet of gas made. The gross profit amounted to £60,043; being at the rate of 8s. 5·82d. per ton of coal carbonized, and 9·67d. per 1000 cubic feet of gas made. The annuities payable amount to £34,000; which are at the rate of 4s. 9·65d. per ton of coal carbonized, and 5·48d. per 1000 cubic feet of gas made. Interest paid amounted to £4467; being at the rate of 7·58d. per ton of coal carbonized, and 0·72d. per 1000 cubic feet of gas made. The quantity of gas made was 1,489,309,000 cubic feet; the yield of gas per ton of coal, 10,522 cubic feet; and the gas unaccounted for amounted to 7·67 per cent. The average illuminating power of the gas was 25·48 candles. The price of gas was 3s. 4d. per 1000 cubic feet from May to October, and 3s. 2d. from October to May. The Engineers have also issued abstracts showing the working of their department; but the principal figures are to a large extent contained in the Treasurer's statement.

At a meeting of the Edinburgh and Leith Gas Commissioners on Monday, it was reported that, during the first month of the current financial year, there had been an increased output of gas amounting to 2,527,000 cubic feet. The Commissioners, in disposing of the surplus of £60,043 from last year, on the recommendation of the Finance Committee, placed £8582 to the sinking funds, and carried forward £50,536. Last year they transferred £17,142 to the sinking funds; and carried forward £37,489. The contribution to the sinking funds last year were double the statutory requirements. This year, Bailie Kinloch Anderson said, they had done what the statute required in respect of contribution to the sinking fund. In some former years, they had done better; but in view of the large expenditure impending, which was to be charged to revenue, they had thought it better just to give the statutory contribution. Moreover, there was a great advantage in having a large balance at the credit of the Commission, for with it they did not require to overdraw from the bank at the time that the collection was not being made. In recent years they had saved large sums through not requiring to overdraw. Speaking of the output of gas, Bailie Kinloch Anderson said they had a very satisfactory state of matters in respect of the reduction of the leakage. Last year at the Edinburgh works the leakage was 10·23 per cent.; this year it was 8·79 per cent. That was still a good deal higher than the leakage in the Leith district; but there was a reasonable explanation of the difference. The situation of the works in Leith was lower than the whole area they supplied; and, moreover, they had no undulating area in Leith such as there was in Edinburgh—the gas rising without much pressure to the highest point. In the Edinburgh area the gas rose, but had to be forced down again; and the greater the pressure, of course, the more the leakage. In Edinburgh the length of the pipes was double that of the pipes in the Leith district; and they extended over far outlying districts. With the advantage of the new service-mains, there was every reason to expect that there would be a reduction in the leakage in Edinburgh in future.

Sheriff Berry, of Glasgow, has this week given his decision in an action which determines the powers of a Corporation owning gas-works to cut off the supply of gas when payment is not made of a sum due for supply. The pursuer raised his action in the Small Debt Court, before one of the Sheriffs-Substitute; but the question was considered of such importance that the Sheriff-Principal was asked to hear it. Prior to the 5th of January last, the pursuer, Mr. David Campbell, occupied a shop at No. 197, Castle Street, Glasgow. On that date, he transferred his business to another, and began business at No. 95 in the same street. The gas supplied at No. 197 had not been paid for; and the Corporation declined to supply gas for the new shop. In this action, Campbell sought to recover £12 as damages for failure to supply. He said he had arranged with the new occupier of No. 197 to relieve him of the charge for the gas supplied to that shop; and he offered to pay, or to find security for the payment for, any gas which might be supplied to him at No. 95. The Sheriff has decided that the Corporation are not bound to give a supply; and he has granted them absolvitor. The judgment is based upon section 18 of the Glasgow Gas Company's Act of 1817, in which power is given to cut off the supply of gas to any house or houses occupied by a defaulter, which power was transferred to the Corporation by their 1869 Act. Section 64 of the later Act confers the same powers. In the Sheriff's opinion, the Corporation are entitled to decline to supply gas to anyone who fails to pay a charge for gas supplied to him, without regard to whether the premises to which the refusal applies are or are not the same as those in respect of which the charge had been incurred. The earlier enactment, by the use of the plural number, seemed to authorize a refusal, in regard to all buildings, of the person in default. It was by the person in arrear, and not by any particular premises, that a forfeiture of the right to require a supply of gas was incurred. It mattered not, in a question with a defaulter, whether the default had been incurred in regard to one set of premises or another. A similar question was decided in the same way in 1883 by his predecessor, Sheriff Clark; but he had formed an independent judgment in this case, though he was glad that, in the result, he agreed with Sheriff Clark. I should say the Sheriff could not have come to any other decision than that he has given. The Corporation had no contract with the new tenant of No. 197 for the supply of the gas which was unpaid for; and they could not have recovered the amount as against him. Their only course, therefore, was to proceed against the man who incurred the debt to them; and the step they took against him was clearly within their right.

I have this morning (being obliged to send off my "Notes" earlier than usual, on account of the Bank Holiday on Monday) received, through a courtesy which I desire to acknowledge, a copy of the accounts of the Glasgow Gas and Electricity Department. I have already given a summary of the more salient features of the accounts. There are, however, matters contained in them which I would like to call attention to; but I cannot find time to prepare a note upon the subject this week, and consequently it must be held over. I may, however, add my tribute this year to what I have formerly written on the subject, regarding the admirable manner in which the undertaking is managed, both in the works and in the finance department.

The Institution of Mechanical Engineers have met in conference in Glasgow this week, under the presidency of Professor A. B. W. Kennedy, of London. The first paper was a description by Mr. A. S. Biggart, of Glasgow, one of the assistants to Sir William Arrol, M.P., the co-inventor with Mr. William Foulis, of the Arrol-Foulis stoking machinery, of hydraulic stoking machinery and labour-saving appliances in modern gas-works. The paper was an important one; and it was followed by a discussion of some interest. Among other papers was one on hydraulic supply in towns, by Mr. Edward B. Ellington, of London, in which special allusion was made to the recently inaugurated hydraulic water supply in Glasgow.

Very curiously, on the occasion of the dinner to the Institution, on the evening of the first day of the meeting, the electric light in the dining-hall went out. By a cruel irony, the Chairman was Professor Kennedy, the Engineer of the Glasgow electric light installation.

The Carluke Gas Company have paid a dividend for the past year at the rate of 6s. per share, and have reduced the price of gas from 4s. 2d. to 3s. 9d. per 1000 cubic feet. The Coatbridge Gas Company have paid the maximum dividends of 10 and 7 per cent. on the original and new stocks of the Company, for the past year.

Representatives of the Scotch Oil Companies met in Glasgow this week, and fixed the price of burning oil during the coming season at from 6¾d. to 7d. per gallon. This is slightly easier than recent prices. As I have said before, the price of oil for gas-making purposes has advanced comparatively little—only a few shillings per ton. The rise in burning oil, which is at the rate of nearly 2d. per gallon, amounts to, I think, over £2 per ton.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 2.

Sulphate of Ammonia.—In the closing days of last month, the market hardened appreciably; there being July contracts to be covered. But at the opening of the present month, the necessity for immediate purchasing has disappeared; and the tone is again weaker. Speculators are now directing their attention to depressing values for August. Makers are not offering for forward delivery; but there are sellers in the field who are offering over the next three months at a moderate premium on spot prices—no doubt relying upon the larger production which may be expected as the winter is approached, and upon the less firm attitude of some of the large makers who, it is reported, have been accepting current prices for apparently more than their current make. The quotation at the ports is £9 10s. f.o.b.

Nitrate of Soda is quiet at 8s. 3d. per cwt. for fine quality on spot. Autumn shipments are worth 8s. 1½d. to 8s. 4½d. per cwt., according to test and position.

LONDON, *Aug.* 2.

Tar Products.—Pitch continues to enjoy a firm market; and business for forward delivery is being booked at prices quoted below, notwithstanding the protest of fuel makers that the present prices of pitch leaves them a loss. Benzols and solvent naphtha are weak, with a tendency to still lower prices. There is a better feeling in respect to carbolic acid products; and both picric acid, salicylic acid, and other phenol derivatives are unquestionably improving both in demand and value. Creosote oils are practically unsaleable; and many distillers, even now, during a period of short production, are compelled to burn them as fuel. Anthracene is firm, with a little more business doing. Crude naphthalene is also moving off at slightly improved rates. Business during the week has been done at the following rates: Tar, 18s. to 20s. 6d. Pitch, West Coast ports, 35s.; East Coast ports, 37s. 6d. Benzols, 50's and 90's, 11d. Solvent naphtha, 1s. 0½d. Toluol, 1s. 0½d. Crude, 30 per cent., naphtha, 4½d. Creosote, liquid, 1½d.; ordinary, ¾d. Naphthalene salts, 21s. Cresylic acid, refined, 1s.; brown, 10½d. Carbolic acid, 60's, 1s. 6½d. Anthracene, "A" quality, 1s. 1d.; "B," 10d.

Sulphate of Ammonia continues to show great lassitude. The very life seems to be knocked out of this market; but it is hoped, with the advance of the autumn, that larger business will be forthcoming. From a

nitrogen value point of view, sulphate is very cheap compared with nitrate. Transactions during the week have realized £9 5s. to £9 10s., less 3½ per cent., according to port of shipment. Gas liquor is quoted at 6s. 9d. to 7s. 9d.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—One or two gas-coal contracts are still pending—that for the Salford Corporation being not yet settled; and for the present matters seem to be in abeyance. The excessively low prices at which the commoner descriptions of round coal are now being forced upon the market is probably inducing buyers of gas coal to wait further developments. As regards gas-coal prices, there is no quotable change. The average figure for good Wigan four-feet remains at 6s. 6d. per ton at the pit; partially screened Arley gas coal, at about 7s. In the better qualities of round coal, quoted prices are also nominally unchanged; colliery owners generally preferring either to stock or to restrict their "get," until the supply of winter requirements brings an increased demand upon the market, rather than attempt to force sales now at lower figures. At the pit mouth, best Wigan Arley remains nominally at 10s. to 10s. 6d. per ton; Pemberton four-feet and seconds Arley, 8s. 6d. to 9s.; and common house coals, 7s. to 7s. 6d. The lower descriptions of round coal, for steam and forge purposes, are, however, being pushed upon the market at all sorts of figures; and to clear away surplus supplies promptly, colliery proprietors in some cases are evidently prepared to accept almost any price that buyers offer. Good ordinary descriptions of Lancashire steam and forge coals do not average more than 6s. to 6s. 6d. per ton at the pit for inland sales; while for shipment, as low as 5s. 3d. to 5s. 6d. is being taken—representing 7s. to 7s. 3d. delivered at the ports on the Mersey—although some of the better qualities are still being held firmly at 7s. 6d. to 7s. 9d. per ton. The very limited output of slack, helps to keep up prices of engine fuel; and with their present get, some of the collieries are short of supplies to meet the requirements of their customers. There are, however, still large stocks on the ground at some of the collieries; and these prevent any upward move—3s. to 3s. 6d. per ton being still the average for ordinary descriptions, with 4s. 6d. to 5s. quoted for better qualities of engine fuel.

Northern Coal Trade.—There has been an improved demand both for gas and steam coal during the last few days, but more especially the latter; the shipments having shown a satisfactory increase, in the expectation of a larger demand at the Baltic ports. Best Northumbrian steam coals are quoted at 9s. per ton f.o.b.; and the collieries are now well employed. The enlarged production of steam small coals is rather tending to bring down the price for that kind of fuel; and about 3s. 3d. per ton is now the current quotation. Manufacturing coal is in rather better request; and there is a decided increase in the consumption of railway coal—traffic on the local lines being larger. In regard to gas coal, there are now much larger deliveries, though they are far below those of the later months of the year. Still, the quantity taken both to distant gas companies by sea, and to the local companies by land, are increasing satisfactorily; and with an average export, the work at the gas-coal collieries is now growing fuller, though short time is still needful at many pits. The price of good Durham gas coal varies from 6s. up to about 7s. per ton, though one or two collieries occasionally ask a higher price. The coke trade is decidedly firmer, there being a larger quantity sent to the north-western furnaces; so that, with Baltic exports, the output is more readily taken up. The price is still from about 12s. 6d. to 13s. 6d. per ton f.o.b., according to quality. Gas coke maintains its price steadily, with small stocks; production being limited to the winter make, though now increasing.

Scotch Coal Trade.—Trade appears to be reviving. This week there has been a better tone in the market. Steam and splint are unaltered as to price; splint being very abundant. The other varieties are in better demand. The prices quoted are: Main, 5s. 10d. to 6s. per ton f.o.b. Glasgow; ell, 6s. 9d. to 7s. (full); splint, 6s. 3d.; and steam, 7s. 6d. to 7s. 9d. The shipments for the week amounted to 166,256 tons—an increase upon the quantity in the preceding week of 38,401 tons, and as compared with the corresponding week of last year of 141,181 tons. For the year to date, the total shipments have been 3,911,235 tons—an increase over the quantity in the same period of last year of 220,115 tons.

Electric Lighting at Derby.—Included in an application which the Derby Corporation have made for certain loans for various objects, is a sum of £13,000 for electric lighting. For this purpose, the Board have already sanctioned £35,000; and the additional £13,000 now asked for is really to make up the actual expenditure over and above the sum previously granted. This was explained by the Town Clerk to Colonel W. M. Ducat at an inquiry held by him last Wednesday; and it was also stated that the extra expenditure was very necessary—alterations to the adjoining premises and the erection of additional boilers being the principal items.

The Inclined Retort System at Huddersfield.—At the last meeting of the Huddersfield County Borough Council, a reference in the minutes of the Gas Committee to the royalties the Corporation had to pay the Automatic Coal-Gas Retort Company, Limited, caused the Mayor (Alderman Brook) to inquire what was the amount of the royalties, as he did not know they had subjected themselves to any. Alderman Stocks replied that there were certain patents in connection with the inclined retorts upon which royalties existed, and which the Committee had entered into an agreement to pay some time ago. If the Council could oblige the Company by paying at once, they would allow them a certain discount. The Council could borrow money at 3 per cent.; and, by paying the Company, they could obtain a reduction of 40 or 50 per cent. Pressed by Mr. Mellor, Alderman Stocks added that the liability, which amounted to £1200, had been paid off. In answer to Mr. Gee, he also mentioned that the Council were allowed a considerable reduction by the Company when they adopted the inclined retorts, because they were among the earliest to do so. In the first place, they had a reduction of 50 per cent.; and this was on the same basis.

The Ackworth, Featherstone, and Purston Gas Company.—The Directors of this Company some time since decided upon making extensive alterations and additions at their works, in order to meet the great demands put upon them by the large increase of property recently erected in the neighbourhood. Under the direction of the Manager (Mr. Moat), the work is now well in hand. At the present time, there are four purifiers in use, each 6 feet square; and four others are being constructed, each 10 feet square. A new engine and exhauster are to be erected, also a station-meter house, lime-store, &c. The estimated cost of the proposed works is about £500; and it is expected that, when the additions have been completed, about three times the quantity of gas will be made. It is hoped the work will be finished before winter sets in.

Portland (Oregon) Water Supply.—According to a recent report of the British Vice-Consul at Portland, the new water-works supplying that city with 25 million gallons a day, and costing £640,870 are completed. The water is taken from Bull Run River, a clear mountain stream flowing from a lake near the base of Mount Hood, and brought in a pipe 24 miles long to a reservoir 404 feet above low water on the east side of the river near Portland. Thence it is carried across the river through a submerged pipe to a reservoir in the City Park, 6 miles distant, at an elevation of 290 feet above the levels of the city streets. The high-service reservoirs on the east and west sides of the river are connected with low-service reservoirs; but the water can be supplied direct to the city mains without passing through the latter. The four reservoirs have a capacity of 67½ million gallons; and the supply is stated to be inexhaustible.

An Interesting Reminiscence.—The *Belfast News Letter* publishes a short article giving an account of an event of some historical interest connected with the water supply of the borough. We gather therefrom that the supply was formerly in the hands of the Belfast Charitable Society, who held certain lands and springs in Malone; and their rights in this respect only merged in the Water Commissioners by an Act passed in 1840, under which the latter body was incorporated. Immediately after incorporation, the Commissioners proceeded to construct certain works near the Antrim Road for the collection of the waters of Carr's Glen; and in the course of time, these works have been followed by the various other schemes which the increase in the population has rendered absolutely necessary. A hundred years ago—on July 22, 1795—at a meeting of the Board of Management of the Charitable Society, the question of the water supply of the borough (which evidently had been previously under consideration) was introduced; and a Committee was then chosen to "superintend the works necessary to convey water to the town." The wonderful development since that date in the matter of the water supply is in itself a striking testimony to the marvellous progress of Belfast.

The Proposed Auxiliary Water Supply from Wales.—Commenting, a few days ago upon the address of Sir Arthur Arnold on the work of the London County Council, noticed in the JOURNAL last week, *The Times* alluded to the confidence manifested by him as to the capability of the Council to manage all the gas and water arrangements of the Metropolis. Sir Arthur cannot conceive any difficulty in the case which could not easily be overcome by enlarging the Council. "There is a charming simplicity," remarks our contemporary, "about the implication that the fitness of a body of this kind to undertake the whole industrial work of the community is limited only by the physical powers of its members." Sir Arthur, it may be remembered, lately inspected the intakes of the Water Companies; and he feels certain that no one who has done so can doubt the urgency of drawing a wholly new supply from Wales. "This grandiose and enormously costly scheme," said *The Times*, "has singular charms for those who love to magnify their office in the County Council. Yet what concerns the people of London is not the character of the water at the Thames intakes, but its quality as delivered in their homes. Drinking water is a manufactured product in all save rare cases; and the manufacture in the Thames Valley has been brought to a high pitch of excellence. Soft water from Wales might save Londoners something in soap, which they would never feel; but it would mean an enormous addition to rates and to capital burdens. It might also turn out, as soft water has in other cases, to involve perils of its own, more subtle and more difficult to deal with than the impurities present at the Thames intakes. Water questions are not to be settled by sentimental preferences for Welsh valleys."

The Payment of Wages during Periods of Sickness.—This was the subject of a long discussion at the last meeting of the Gas Committee of the Oldham Corporation. It was introduced by Mr. Harrop, who said he had framed a resolution which he wished to be the basis of a new rule. It was—"That this Committee decide that any official being away from work for more than a month, his wages be paid at the rate of one-half, and this rate continue at the option of the Committee for three months, at the expiration of which time the wages shall cease altogether." Mr. Harrop explained that he did not move this resolution with the idea that the period or the rate stated should be unalterable; but so that the Committee should have some ground on which to proceed. To his mind, it was very unsatisfactory and inconvenient that they should have no fixed rule on which to work when cases of sickness arose. The resolution did not commend itself to the mover's colleagues. Alderman Hall pointed out that circumstances materially altered cases. For instance, a man might be ill through working excessive hours, or he might meet with an accident of some kind; and he thought the better plan was to leave these matters in the hands of the Committee, to deal with as they arose, and to take each case on its merits. The Chairman (Alderman Smith) concurred with the remarks of the last speaker; and Mr. Johnson instanced a case where a man might have a leg broken, and be compelled to be absent from work for twice the length of time mentioned in the resolution. Mr. Harrop said he did not firmly adhere to his resolution; what he wanted was a rule put in force, so that all employees could be dealt with alike. In case of an accident on the works, he would certainly not propose to stop the man's wages. What he meant was to apply this rule in cases where the men were away through illness arising from something over which the Committee had no control. The resolution was seconded; but it did not receive any additional support.

Incandescent Gas-Burners for Public Lighting.—The Directors of the Needham Market Gas Company have decided to substitute incandescent burners for the ordinary ones in the public lamps.

Reduction in Price.—The Hoylake and West Kirby Gas and Water Company, Limited, have given notice that after Sept. 30 next the price of gas will be reduced from 4s. 2d. to 4s. per 1000 cubic feet. The charge for gas used for cooking and heating purposes is 3s. 9d.

Serious Explosion of Gas at Lodz.—According to a telegram, dated last Saturday, received through Reuter's Agency, from Lodz, a Polish town situated some 75 miles to the south-west of Warsaw, an explosion of gas which occurred there caused the fall of a house, resulting in the death of three persons, and injury to a number of others.

The Public Lighting of New York.—The city of New York is lighted by 25,123 gas-lamps, and 2725 electric lights. In the course of a year, each gas-lamp burns for a total of 4000 hours. The electric lights burn for 3950 hours annually. The estimated cost of lighting the city streets this year will be $980,000. The city has now more street lights in use and in preparation than ever before.

Improvements at the Shepshed Gas-Works.—Messrs. R. Dempster and Sons, Limited, of Elland, are carrying out for the Shepshed Gas Company, under the direction of their Consulting Engineer, a new holder, to contain 30,000 cubic feet, and a brick tank. They are also erecting new retorts on the regenerator principle, and putting down an exhauster and pumps driven by a gas-engine made in accordance with Messrs. Crossley's latest patent.

The Finances of the Manchester Corporation Gas Department.—The report of the Gas Committee of the Manchester Corporation for the year ended March 31 last, states that the revenue was £579,277, or £10,246 more than in the previous year. The sum of £54,044 goes to aid the city rates, and, in addition, £15,000 has been voted for the same purpose for the year ending next March. The revenue of the electric lighting department for the twelve months has been £28,640, the available balance being £5709.

Colne Water Supply.—For some time past, the local authority of Colne, in consequence of the increasing population, have found it difficult to provide an adequate supply of pure water. After being disappointed in their boring operations for an increased supply at Rudshaw Moss, three miles distant, they have turned their attention to the Wycollar district, four miles away; and the report of the Engineers is that there is such a supply of good water in that neighbourhood as will serve the town for several years. A new compensation reservoir will have to be constructed.

The Ossett Town Council and the Gas Question.—At a special meeting of the Ossett Town Council last Wednesday, eight members voted for a resolution to promote a Bill in the next session of Parliament for the compulsory purchase of the gas undertaking which supplies the borough and Horbury. Five members voted against it, and two were neutral. Nine votes being required to pass the resolution, it fell to the ground. The Directors of the Company have given notice of a reduction of 3d. per 1000 cubic feet in the price of gas—from 3s. to 2s. 9d.

Gas Affairs at Ripon.—At the meeting of the Ripon City Council yesterday week, the Mayor (Mr. Baynes) made a report with reference to the recent laying of new gas-mains in a portion of the city, which will tend to reduce the amount of unaccounted-for gas. The leakage over the 14¾ miles of mains in the district of supply amounted to 3,503,777 cubic feet, the value of which, at 2s. 1d. per 1000 cubic feet—the cost of production—was £365 per annum. It was also stated that in four years £16,000 on gas-works capital account would be paid off; and a saving of £900 a year effected.

The Purchase of the Rastrick Gas-Works by the Brighouse Corporation.—These works have now passed into the possession of the Brighouse Corporation, by agreement with the Rastrick Gas Company, at a price of £50,300. The purchase of the works was sanctioned in the Brighouse Corporation Bill passed last session; and on Wednesday last a cheque for £48,523 16s. 11d. was handed over by the Corporation to the Gas Company in payment for the works—the balance between this sum and the purchase price agreed upon being made up of liabilities taken over by the Corporation in connection with the works.

Sick and Funeral Society of the Leicester Corporation Gas and Electric Lighting Department.—The sixth annual meeting of the members of the Sick and Funeral Allowance Society in connection with the Gas and Electric Lighting Department of the Leicester Corporation was held last Friday week; the President (Mr. Alfred Colson) in the chair. The report showed that during the past twelve months £388 was received in subscriptions, and £28 in levies. The total receipts were £458. A sum of £285 was paid to sick members, and £38 for the funeral allowances of four members and two members' wives. The total expenditure was £354. The balance in hand was £505, or a gain of £103 on the year.

The Price of Gas for Public Purposes at Swansea.—A Sub-Committee of the Streets Committee of the Swansea County Council lately had an interview with the Directors of the Gas Company, at which they asked for a reduction in the price of gas supplied to the public lamps and the various police stations. The Secretary of the Company (Mr. Thornton Andrews) has forwarded a reply to the Committee, in which he says the Directors regret they are unable to make any further reduction than already exists, having regard to the large capital expended in many districts solely for the supply of gas to the public lamps, the consequent unremunerative return per mile of main, and, in addition, the heavy cost of maintenance and repair of the lanterns. At a recent meeting of the Council, Alderman Tutton described this answer as decidedly unsatisfactory, and said he considered that steps ought to be taken to bring the Company to a reasonable frame of mind. They had always paid their maximum dividends; and now that coal was cheap and labour plentiful, they ought to have conceded the request of the Corporation.

Polluting Lancashire Rivers.—At the Blackburn County Court last Tuesday, the Accrington and Church Outfall Sewerage Board were sued by the Ribble Committee for disobeying an order to carry out a sewage scheme within 18 months. Judge Coventry said there had been unjustifiable delay by the defendants in spending seven months in experiments, instead of adopting a scheme. He imposed a penalty of £250 (at the rate of £10 daily), with costs on the higher scale.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 281.)

Issue.	Share	Whe ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Pa'd per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Invest. ment.
£			p.c.	GAS COMPANIES.				£ s. d.
590,000	10	10 Apl.	10½	Alliance & Dublin 10 p. c.	10	22–23	..	4 11 4
100,000	10	,,	7½	Do. 7 p. c.	10	15½–16½	..	4 10 11
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	104–106	..	4 14 4
200,000	5	10 May	6½	Bombay, Limited	5	7–7¼	..	4 6 8
40,000	5	,,	6½	Do. New	4	5–5¼	..	4 14 7
380,000	Stck.	28 Feb.	12†	Brentford Consolidated	100	257–262	..	4 11 7
180,000	,,	,,	9†	Do. New	100	205–210	..	4 5 8
220,000	Stck.	14 Mar.	11	Brighton & Hove Original	100	227–232	..	4 14 10
888,500	Stck.	28 Feb.	5	Bristol	100	125–130	..	3 16 11
320,000	20	28 Mar.	11½	British	20	54–56	..	4 0 4
50,000	10	14 Mar.	11½	Bromley, Ordinary 10 p. c.	10	22–23	..	5 0 0
51,510	10	,,	8½	Do. 7 p. c.	10	17–18	..	4 14 5
328,750	10	12 June	4	Buenos Ayres (New) Limited	10	7⅞–8	..	5 0 0
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	100–103	+1	5 16 7
150,000	20	11 July	8½	Cagliari, Limited	20	28–30	..	5 10 0
550,000	Stck.	10 Apl.	13½	Commercial, Old Stock	100	299–304	..	4 8 9
165,000	,,	,,	10½	Do. New o.	100	225–230	..	4 11 4
160,762	,,	12 June	4½	Do. 4½ p. c. Deb. do.	100	143–147	..	3 1 1
800,000	Stck.	12 June	13	Continental Union, Limited.	100	265–275	+5	4 14 6
200,000	,,	,,	10	Do. 7 p. c. Pref.	100	203–208	..	4 16 2
535,000	Stck.	28 Feb.	5½	Crystal Palace Ord. 5 p. c. Stk	100	125–130	..	4 0 9
486,090	10	26 July	11	European, Limited	10	25–26*	..	4 4 7
354,060	10	,,	11	Do. Partly paid	7½	17–18*	+½	4 14 3
5,646,590	Stck.	14 Feb.	12¾†	Gaslight & Coke, A. Ordinary	100½	290–295	+2	4 6 5
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	107–112	+2	3 11 5
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	280–285	..	3 10 2
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130–135	..	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	197–202	..	3 14 3
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	190–195	..	3 11 9
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	277–282	..	3 10 10
476,000	,,	,,	6	Do. K, 6 p. c. Prf..	100	165–170	..	3 10 7
1,061,150	,,	12 June	4	Do. 4 p. c. Deb. Stk.	100	130–133	..	3 0 2
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	140–145	..	3 2 1
908,000	,,	,,	6	Do. 6 p. c. do.	100	200–205	+2½	2 18 6
3,800,000	Stck.	10 May	12	Imperial Continental	100	252–257	..	4 13 3
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	5¾–6¼	..	4 16 0
560,000	100	1 Apl.	5	Met.of Melbourne, 5 p.c. Deb.	100	115–117	..	4 5 6
541,920	20	12 June	5	Monte Video, Limited	20	16½–17¼	+½	5 14 3
150,000	5	21 May	8	Oriental, Limited	5	7¼–7¾	..	5 3 2
60,000	5	28 Mar.	7	Ottoman, Limited	5	5–5¼	..	6 7 3
166,870	10	14 Feb.	2	Para, Limited	10	1⅞–2¼	..	8 0 0
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	102–106	..	5 13 2
500,000	100	4 June	6	2nd Do.	100	100–105	..	5 14 3
150,000	10	26 Apl.	7	San Paulo, Limited	10	10–11	..	6 7 3
500,000	Stck.	14 Feb.	15½	South Metropolitan, A Stock	100	355–365	..	4 4 11
1,350,000	,,	,,	12	Do. B do.	100	302–307	..	3 18 2
290,000	,,	,,	13	Do. C do.	100	310–315	..	4 2 6
775,000	,,	11 July	5	Do. 5 p. c. Deb. Stk.	100	172–176	..	2 16 10
60,000	Stck.	28 Feb.	11½	Tottenham & Edm'nton, "A"	100	230–235	..	4 17 10
				WATER COMPANIES.				
746,021	Stck.	26 June	10	Chelsea, Ordinary	100	290–295	..	3 7 10
1,719,514	Stck.	10 Apl.	8	East London, Ordinary	100	230–235	–3	3 8 1
651,740	,,	26 June	4½	Do. 4½ p. c. Deb. Stk.	100	157–162	..	2 15 6
700,000	50	26 June	7	Grand Junction	50	114–118	..	2 19 4
708,000	Stck.	14 Feb.	12	Kent	100	307–312	..	3 16 11
1,043,800	100	26 June	7½	Lambeth, 10 p. c. max.	100	260–264	..	2 16 9
406,200	100	,,	7½	Do. 7½ p. c. max.	100	208–213	..	3 10 5
330,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	145–150	..	2 13 4
500,000	100	14 Feb.	12½	New River, New Shares	100	390–400	..	3 3 9
1,000,000	Stck.	26 July	4	Do. 4 p. c. Deb. Stk.	100	143–145*	..	2 14 2
902,300	Stck.	12 June	4	S'thwk & V'xhall, 10 p.c. max.	100	157–163	..	2 9 1
126,500	100	,,	4	Do. D 7½ p.c. do.	100	140–145	..	2 15 2
1,155,066	Stck.	12 June	10	West Middlesex	100	288–293	..	3 8 3
						*Ex div.		

† Next dividend will be at this rate.

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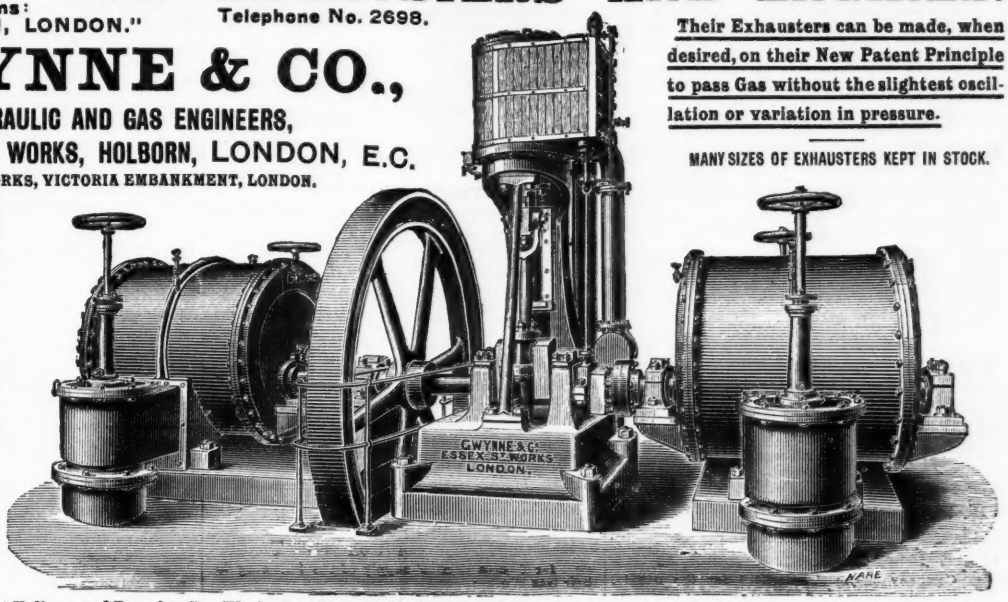

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W. C. HOLMES & CO., Huddersfield; AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also Improved Patent Rotary Scrubber-Washers.
*** See Advertisement p. 270 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited; Chemical Works, Leeds, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 95, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office MIDDLESBROUGH. Correspondence invited.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality.
Sample and Price on application.
OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

OXIDE OF IRON.

FINEST Quality of Natural Bog Ore.
Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."

THE Undersigned is in a position to supply, at the very lowest Prices, the most suitable kind of BENZOL for enriching Gas, made from Hardman's Patent Carbonization Process, of which I am the Sole Patentee. On application, I would furnish Price on the most reasonable terms; giving advice how to utilize it on the most economical method.
J. HARDMAN, Manufacturing Chemist.
Milton, Staffs.

In Paper Covers, Post Free 2s.

STEPHEN CARPENTER, of the Bow Common Gas-Works, on the Purification of Coal Gas by Lime, Oxide of Iron, and Atmospheric Air, and the Method of Working Purifiers so that the Lime may be used a second time, with a description of Carpenter's short Method of working off the Sulphur Test and Table for calculating Results.
S. & H. W. CARPENTER, 3, Bedford Villas, Carshalton, SURREY.

TO ENGINEERS AND MANAGERS.

MR. J. L. FEATHERSTONE (late Chief Draughtsman to Humphreys and Glasgow) is prepared to supply complete WORKING DRAWINGS, SPECIFICATIONS, and QUANTITIES for WATER-GAS PLANT. Own design.
Also DRAWINGS, TRACINGS, &c., of COAL GAS PLANT; Specially prepared for work wanted in a hurry. Moderate Charges.
Temporary Offices: 27, FORE STREET, E.C.

WANTED, a Situation as Gas-Fitter, METER and STOVE FIXER, and SERVICE LAYER (Iron or Compo.). References.
Address No. 2551, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as General FOREMAN, in a large or medium sized Gas-Works. Practically conversant with every detail of the work to be performed, and the duties required to be discharged.
Highest References and Testimonials.
Address No. 2550, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Spent Oxide for prompt delivery, any quantity, containing not less than 50 per cent. Sulphur.
Apply J. HARDMAN, Milton, STAFFS.

PUPIL WANTED.

AN Assoc.M.Inst.C.E., Resident Engineer of a Provincial Gas and Water Works, is prepared to receive a PUPIL. The opportunities for acquiring knowledge will be considerable, as the construction of Reservoirs and Filter-Beds, and the laying of Pipes from such Reservoirs are to be commenced shortly.

Terms and Conditions may be had by writing to No. 2547, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TONBRIDGE GAS COMPANY.

THE Directors of the above Company invite APPLICATIONS for the position of MANAGER of their Works. Candidates must have had thorough practical experience in the Manufacture and Distribution of Gas, Main Laying, &c.

Salary, £200 per Annum, with Residence, Gas, Coal, &c.

Applications, stating Age, if married or single, accompanied by recent Testimonials (not more than three in number), to be sent in, addressed to the Chairman of the above Company, not later than Monday, the 12th day of August, 1895.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for about 50 Tons of SPENT OXIDE, delivered free on Rails at Heywood.

Specification and Form of Tender may be obtained from Mr. W. Whatmough, Gas Manager.

Sealed tenders, endorsed "Spent Oxide," to be sent to me not later than Tuesday, Aug. 13, 1895.

By order,
A. B. PILLING,
Town Clerk.

Municipal Buildings, Heywood,
July 26, 1895.

THE Directors of the Cleethorpes Gas Company invite TENDERS for the supply, delivery, and erection of an 80 Feet diameter SINGLE-LIFT GASHOLDER, fitted with Hydraulic Cup for Telescoping when required.

Plan of the proposed Holder may be seen, and copies of Specification obtained, on application to the undersigned, to whom tenders are to be delivered not later than the 17th inst.

The Directors do not bind themselves to accept any tender.

By order,
E. J. BROCKWAY,
Engineer and General Manager.

THE Directors of the Cleethorpes Gas Company invite TENDERS for the construction of a BRICK and PUDDLE GASHOLDER TANK, 84 Feet diameter.

Drawings and Specification may be seen, and all necessary Particulars obtained, on application to the undersigned, to whom tenders are to be delivered not later than the 17th inst.

The Directors do not bind themselves to accept any tender.

By order,
E. J. BROCKWAY,
Engineer and General Manager.

COUNTY BOROUGH OF SALFORD.

OXIDE OF IRON.

THE Gas Committee are prepared to receive TENDERS for the supply of 400 Tons of OXIDE OF IRON for Purifying the Gas at their Works.

Forms of Tender and further Particulars may be obtained on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.

Sealed tenders, endorsed "Oxide of Iron," to be sent to me not later than Five p.m., on Thursday, Aug. 15 next, addressed to the Chairman of the Gas Committee.

By order,
SAML. BROWN,
Town Clerk.

Town Hall, Salford,
July 30, 1895.

COUNTY BOROUGH OF SALFORD.

SPENT OXIDE.

THE Gas Committee invite Tenders for the purchase of about 760 Tons of SPENT OXIDE.

Further Particulars and Form of Tender may be obtained from the Gas Engineer, Gas Offices, Bloom Street, Salford.

Sealed tenders, endorsed "Spent Oxide," to be sent to me not later than Five p.m., on Thursday, Aug. 15 next, addressed to the Chairman of the Gas Committee.

By order,
SAML. BROWN,
Town Clerk.

Town Hall, Salford,
July 30, 1895.

TENDERS FOR COAL.

THE Directors of the Isle of Thanet Gas-light and Coke Company invite TENDERS for the supply of the best NEWCASTLE GAS COAL, to be delivered into the Company's Works at Margate in specified Monthly quantities for One, Two, or Three Years, commencing the 15th of March, 1896.

The approximate yearly requirements will be: First Year, 15,500 Tons; Second Year, 16,000 Tons; and Third Year, 16,000 Tons.

Sealed tenders, endorsed "Coal," on Forms to be obtained from the undersigned, to be sent in on or before Thursday, the 29th of August, addressed to the Chairman of the Company.

The Engineer, Mr. H. H. Jones, will furnish any further Particulars that may be required.

The Directors do not bind themselves to accept the lowest or any tender.

THOMAS C. FULLER,
Secretary.

Gas-Works, Margate,
Aug. 1, 1895.

TENDERS FOR GAS COAL.

THE Directors of the Newark Gas Company are prepared to receive TENDERS for the supply of 4000 Tons of best screened SOUTH YORKSHIRE GAS COAL, delivered at Newark, G.N.R., in such quantities as may be required during the ensuing Year from Sept. 1 next.

The Coal to be delivered fresh wrought, free from Dirt, Bats, Shale, Pyrites, and other Impurities.

Tenders, marked on the outside "Tender for Coal," to be sent in to me on or before Aug. 20, 1895.

For further Particulars, apply to

FREDK. B. FOOTTIT,
Secretary and Manager.

Newark, July 26, 1895.

GAS COAL REQUIRED.

THE Urban District Council of Milton-next-Sittingbourne invite TENDERS for the supply and delivery of 1000 Tons of GAS COAL, which must be delivered at such times and in such quantities, within One Year from the date of the acceptance of the tender, as the Gas Manager shall direct.

Forms of Tender and all necessary Particulars can be obtained on application to Mr. T. Pike, Gas-Works, Milton.

Sealed tenders, endorsed "Gas Coal," and addressed, Chairman of the Milton-next-Sittingbourne District Council, should be sent or delivered to me on or before Monday, the 12 th day of August next.

The Council do not bind themselves to accept the lowest or any tender.

WM. PARHAM,
Clerk to the Council.

Milton-next-Sittingbourne,
July 31, 1895.

BOROUGH OF CHORLEY CORPORATION GAS-WORKS.

THE Chorley Corporation invite Tenders for Twelve Months' supply of the following for their Gas-Works:—

1. GAS COAL and NUTS, 8000 Tons.
2. LIME.
3. VITRIOL, 80 Tons.

The supply to commence on the 1st of September next.

Forms of Tender for Coal and Vitriol, and any further Information, may be obtained on application to Mr. R. Fearnley, Gas Manager.

Tenders, duly endorsed, to be sent to me on or before Tuesday, the 20th inst.

The Corporation do not bind themselves to accept any tender.

By order,
JNO. MILLS,
Town Clerk.

Town Hall, Chorley,
Aug. 1, 1895.

BOROUGH OF CHORLEY CORPORATION GAS-WORKS.

THE Chorley Corporation invite Tenders for the purchase of the surplus TAR produced at their Gas-Works, for Twelve Months commencing the 1st of September next, delivered in the Contractor's Tanks at either of the Chorley Railway Stations.

Any further Information may be obtained from Mr. R. Fearnley, Gas Manager, Chorley.

The Corporation do not bind themselves to accept the highest or any tender.

Tenders, endorsed "Tar," to be sent to me on or before Tuesday, the 20th inst.

By order,
JNO. MILLS,
Town Clerk.

Town Hall, Chorley,
Aug. 1, 1895.

UXBRIDGE AND HILLINGDON GAS CONSUMERS' COMPANY.

TAR.

THE Directors are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Works during the ensuing Twelve Months from the 1st of September next.

The quantity of Tar will be about 35,000 gallons, and will be delivered free into Contractor's Barges alongside the Works, on the Grand Junction Canal.

Tenders, endorsed, must be addressed to the Chairman, and be delivered at the Company's Offices, High Street, Uxbridge, not later than Saturday Evening, the 10th of August.

The Directors do not bind themselves to accept the highest or any tender.

Further Particulars may be obtained of the undersigned.

(Signed) S. PENNY, Assoc.M.Inst.C.E.,
Engineer and Manager.

Uxbridge, Middlesex,
July, 1895.

CORPORATION OF LEICESTER.

WATER-TANK.

THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the manufacture, delivery, and erection of a CAST-IRON WATER-TANK, to be placed upon a Tower at the Aylestone Road Works.

Drawings may be seen, and Specification and Form of Tender obtained, upon application to the Engineer, and on payment of the sum of £5, which will be returned upon receipt of a *bonâ-fide* tender.

Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Water-Tank," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, Aug. 10 prox.

The Committee do not bind themselves to accept the lowest or any tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.

Offices: Millstone Lane,
Leicester, July 25, 1895.

LEIGH URBAN DISTRICT COUNCIL.

THE Gas Committee of the Leigh Urban District Council invite TENDERS for the purchase of the surplus TAR produced at their Gas-Works for a period of One Year from the 1st of September next.

All Particulars, with Form of Tender, may be had from the undersigned.

Sealed tenders, endorsed "Tar," and addressed to the Chairman of the Gas Committee, to be delivered at the Town Hall, Leigh, on or before Monday, the 12th of August next.

The highest or any tender not necessarily accepted.

ALFRED T. FLETCHER,
Engineer and Manager.

Gas-Works, Leigh,
Lancashire, July 23, 1895.

KENT WATER-WORKS.

TENDERS FOR COALS.

THE Directors of the Kent Water-Works Company invite TENDERS for the supply of SCREENINGS from the best DURHAM COAL at their Pumping-Stations at Crayford, Orpington, and Wilmington, Kent, for One Year.

Approximate quantities—

Crayford . . .	50 to 65 Tons	per week.
Orpington . . .	45 to 55 „	
Wilmington . .	70 to 90 „	

The Coal must be delivered in Sacks, in good and proper condition, and must evaporate not less than 7 lbs. of Water for each pound of Coal, be perfectly free from Slag, or other Mineral or Earthy Matter, and the proportion of Ash and Clinker shall not exceed 10 per cent.

Payments will be made monthly upon the Engineer's Certificate.

The Directors do not bind themselves to accept the lowest or any tender.

The Draft Form of Contract is open for inspection at the Company's Offices, Mill Lane, Deptford.

Other Particulars can be obtained from the Company's Engineer.

Tenders, marked "Tender for Coal," to be transmitted under seal on or before Tuesday, the 13th of August.

ALEXANDER DICKSON,
Secretary of the Company.

July 25, 1895.

OLDBURY URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee of this Council are open to receive TENDERS for the supply of 8000 Tons, or thereabouts, of screened GAS COAL for delivery during the Year ending the 31st of August, 1896, in such quantities and at such times as ordered, carriage free, at the (1) Oldbury Basin, G.W.R., or (2) L. & N.W. Railway, Oldbury.

The Coal must be of First-class quality, well screened, freshly wrought, and as free as possible from Bats, Pyrites, and other foreign matter.

Sealed tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gas Coal," must be delivered to the undersigned not later than Saturday, Aug. 10 next,

The Gas Committee do not bind themselves to accept the lowest or any tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.

Tender Forms and any other Information may be obtained from the undersigned on application in writing.

By order,
A. COOKE,
General Manager.

Gas-Works, Oldbury,
July 20, 1895.

MITCHAM AND WIMBLEDON DISTRICT GAS-LIGHT COMPANY.
(INCORPORATED BY ACT OF PARLIAMENT, 1867.)

NOTICE is Hereby Given, that the FIFTY-SEVENTH ORDINARY HALF-YEARLY GENERAL MEETING of the Shareholders of this Company will be held in the Board-Room, at the Works, Mitcham, in the County of Surrey, on Tuesday, the 20th day of August, 1895, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and a Statement of the Accounts for the Half Year ended the 30th day of June last, to Declare a Dividend, and for General Business.

The TRANSFER BOOKS WILL BE CLOSED from the 6th inst. until after the Meeting.

By order,
BENJAMIN GREEN,
Secretary and Manager.

Offices and Works: Western Road,
Mitcham, August, 1895.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Shareholders of the above Company will be held at the Offices of the Company, No. 30, Gracechurch Street, in the City of London, on Friday, the 30th day of August, 1895, at Eleven o'clock in the Morning precisely, to receive the Report of the Directors and the Accounts for the Half Year ending the 30th day of June last, to declare a Dividend, and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from the 17th to the 30th of August, both inclusive.

By order of the Board,
ALFRED LASS,
Secretary.

Offices: 30, Gracechurch Street,
London, July 31, 1895.

Fcap. 4to, Cloth, price 7s. 6d., post free.

Practical Photometry.

By William Joseph Dibdin, F.I.C., F.C.S.

LONDON: WALTER KING, 11, Bolt Court, FLEET STREET.

NORTH OF IRELAND

ASSOCIATION of GAS MANAGERS.

THE

ANNUAL MEETING

Of this Association

WILL BE HELD IN THE

MAYORALTY ROOMS, DROGHEDA,

ON TUESDAY, AUGUST 13, 1895.

The Chair to be taken at 11.30 a.m. by the President, Mr. P. J. SALMON, Galway.

The Business will consist of the President's Address; Papers by Mr. E. Stears, on "Four Months' Working with Hislop's Regenerative Furnaces, at the Lisburn Gas-Works;" by Mr. M. Martin, on "Successful Methods of doing Ordinary Work;" by Mr. C. B. Tully, on "The Advantages of a Provisional Order for Gas Companies;" and a Lecture (illustrated by Experiments and Lantern Views), by Professor W. Ivison Macadam, F.R.S.E., F.I.C., F.C.S., on "The Illuminating Value of the Various Constituents of Coal and Oil Gas, and the Conditions Necessary to Produce Incandescence."

The Members will dine together in the White Horse Hotel, at Four p.m. Tickets, 4s. each, to be had from the Secretary. *It is important that Dinner Tickets should be secured not later than the 10th of August.*

On Wednesday, arrangements have been made for the Members and Lady Friends having a Picnic Excursion through the Valley of the Boyne; visiting Monasterboice, Mellifont Abbey, Slane, Caves of New Grange, and the Obelisk built on the Site of the Battle of the Boyne. Tickets for Excursion, including Brakes and Refreshments, 5s. each, to be had from the Secretary. Early application for these is requested.

JAMES WHIMSTER,
Hon. Secretary.

Gas-Works, Armagh, July 26, 1895.

NOTICE.

TO GAS ENGINEERS AND OTHERS.

MESSRS. CLAPHAM BROS., Limited, Keighley, Yorkshire, are no longer authorized to Manufacture my CONDENSER and WASHER-SCRUBBERS.

The above-named Gas Apparatus are erected and giving entire satisfaction at the following places: Neath, Lincoln, Sheffield, Ellesmere, Mountain Ash, Malden, Cullingworth, Montreal (Canada), Woodstock (South Africa), Cape Town (South Africa), &c.

These Appliances can now be obtained solely of the undersigned.

Winchester House, London, E.C. J. A. KELMAN.

HUNTER'S

OXIDE OF IRON.

JAMES HUNTER, MINER, AND SHIPPER OF NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

5, PRINCES STREET, PORT GLASGOW.

Telegrams: "HUNTER, PORT GLASGOW."

Established 1872.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co. Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

TO EMPLOYERS, COMPANY DIRECTORS, ETC.

The LAW GUARANTEE & TRUST SOCIETY, LIMITED,

GUARANTEES FIDELITY.

Send for complete Prospectus, containing Balance-Sheet, Copy of Policy, &c., &c.

HEAD OFFICE:

49, CHANCERY LANE, LONDON, W.C.

ARMSTRONG'S

PATENT

CANDLE SAFETY LAMPS.

Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

48, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

LOW MOOR BLACK BED GAS COAL.

YIELD OF GAS PER TON	10,375 CUBIC FEET.
ILLUMINATING POWER	17·50 SPERM CANDLES.
COKE	75 PER CENT.

Prices, f.o.r. or f.o.b., on application to

GEORGE & JOHN HAIGH,

RAVENS LODGE AND CONYERS' COLLIERIES,

DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

NOTICE.

The Incandescent Gas-Light Company, Limited, Hereby Give Notice, that they only supply their Mantles subject to the following express Conditions, which are printed and pasted on each box:—

"The Incandescent Gas-Light Company Limited, in supplying the Mantle contained in this box, grant a Limited License to the purchaser to sell or use the same on the express condition that neither the purchaser nor any other person into whose hands the same may come shall use or sell the said Mantle except in connection, or for use, with Burners sold or supplied by the Company; any other sale or use will amount to Infringement of the Company's Patents. The Company supply Mantles for the purpose of renewals at the nominal price of 1s. 3d., subject to the Conditions and Limitations above set forth."

In the case of *The Incandescent Gas-Light Company, Limited v. Cantelo,* **Mr. Justice Wills upheld the Validity of these Conditions and Limited License; and, in the course of his Judgment, said:—**

"The patentee has the sole right of using and selling the articles; and he may prevent anybody from dealing with them at all. Inasmuch as he has the right to prevent people from using them or dealing in them at all, he has the right to do the lesser thing—that is to say, to impose his own conditions. It does not matter how unreasonable or how absurd the conditions are. It does not matter what they are if he says at the time when the purchaser proposes to buy, or the person proposes to take a license: 'Mind I only give you this license on this condition;' and the purchaser is free to leave it or take it as he likes. If he takes it, he must be bound by the condition."

In the case of *The Incandescent Gas-Light Company v. Hirschfeld and Others,* **the Honourable Mr. Justice Romer certified that the Validity of the Plaintiffs' Patents was established. Infringers in future will be liable to costs as between Solicitor and Client.**

(Signed) **FAITHFULL & OWEN,**
Solicitors for the Incandescent Gas-Light Company, Limited.

"BEAR CREEK" CANNEL.

LOG MOUNTAIN COAL, COKE, AND TIMBER CO.,
PINEVILLE, KENTUCKY, U.S.A.
Cable Address: "Hull, Pineville."

LONDON AGENTS:
W. J. WILSON & Co., Suffolk House, Cannon St., E.C.

AUSTRALIAN BOGHEAD.

Practical Results in Ordinary Working:—

Gas per Ton . . .	15,100 Cub. Ft.
Illuminating Power .	45·6 Candles.

For Samples and Prices, f.o.b. London or c.i.f. to Continental Ports, apply to

THOMAS RAISON & Co.,
117, LEADENHALL STREET, E.C.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·4 candles.
Coke	68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.
B Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS:—

Yield of Gas Per Ton . .	11,205 Cubic Feet.
Illuminating Power,	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. Per Ton.
Sulphur	A little over 1 Per Cent.
Ash	Under 1 Per Cent.
Tar	163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor	103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE, 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton . .	10,500 Cubic Feet.
Illuminating Power .	17 Stand. Sperm Candl.
Coke (of excellent quality) .	13½ Cwt. Per Ton.
Sulphur	1·13 Per Cent.
Ash	1·34 Per Cent.
Tar	180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor	94½ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

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Gas Companies are solicited to try Samples of the
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PIPES, 2-in. to 8-in.
2-in. to 8-in. **PIPES,**
PIPES.
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IRONFOUNDERS,
MIDDLESBROUGH.

BOLDON GAS COALS.
Worked by THE HARTON COAL CO., LTD.
Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the
HARTON COAL COMPANY,
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Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
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Yield of Gas, nearly 12,000 *Cubic Feet per ton of Coal; and Illuminating Power nearly* 17½ *Candles.*

The following is a complete ANALYSIS made by Mr. R. O. PATERSON, C.E., Gas-Works, Cheltenham :—

Specific Gravity (Water 1)	1·276
Weight of One Cubic Foot	79·700 lbs.

PROXIMATE ANALYSIS.

Moisture in Coal	2·68 per cent.
Volatile Matter	35·60 ,,
Fixed Carbon	58·80 ,,
Sulphur	0·96 ,,
Ash	1·96 ,,

COMMERCIAL ANALYSIS.

Gas per Ton of Coal	11,760 cub. feet.
Gas per Cubic Foot of Coal	418 ,,
Illuminating Power	17·44 candles.
Value of One Cubic Foot in Sperm	418 grains.
Value per Ton of Coal in Sperm	703 lbs.
Coke per Ton of Coal	1367 ,,
Coke	61·05 per cent.
Ash in Coke	3·21 ,,
Sulphur Eliminated with Volatile Products per Ton of Coal	9·4 lbs.
Sulphur in Coke per Ton of Coal	12 ,,
Ammoniacal Liquor per Ton of Coal	19·7 galls.
Tar per Ton of Coal	12·2 ,,

R. O. PATERSON, C.E.
Gas-Works, Cheltenham, 8th August, 1894.

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LIMITED,
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Plans and Estimates furnished on application.

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Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

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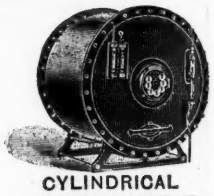
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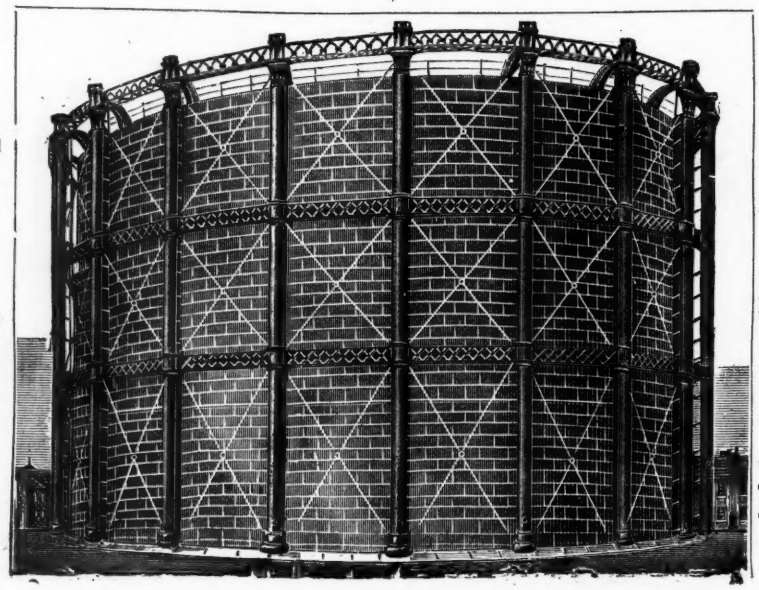

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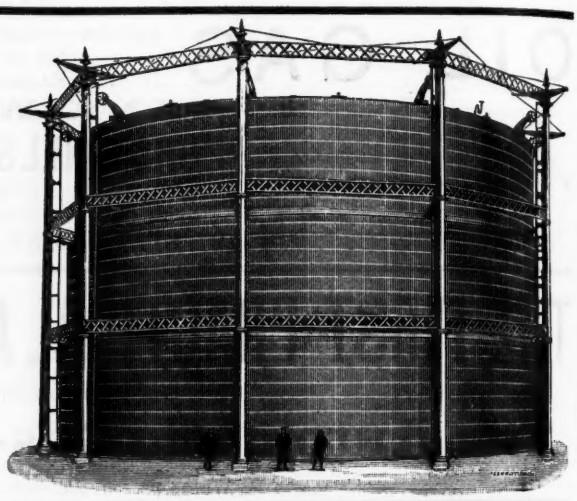

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Results of Tests of Dry Gas-Meters (Section III.) of the Glasgow Philosophical Society's Gas Exhibition, as per London "Gas Journal," May 10, 1881.

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Total of Fast Tests . .	47·2	6·9	33 6	62·3	53·7
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	72·5	124·3	76·7	93·7	92·2

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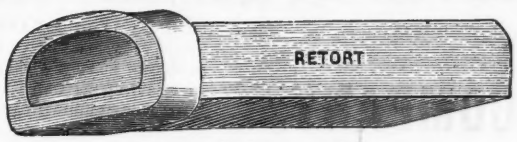

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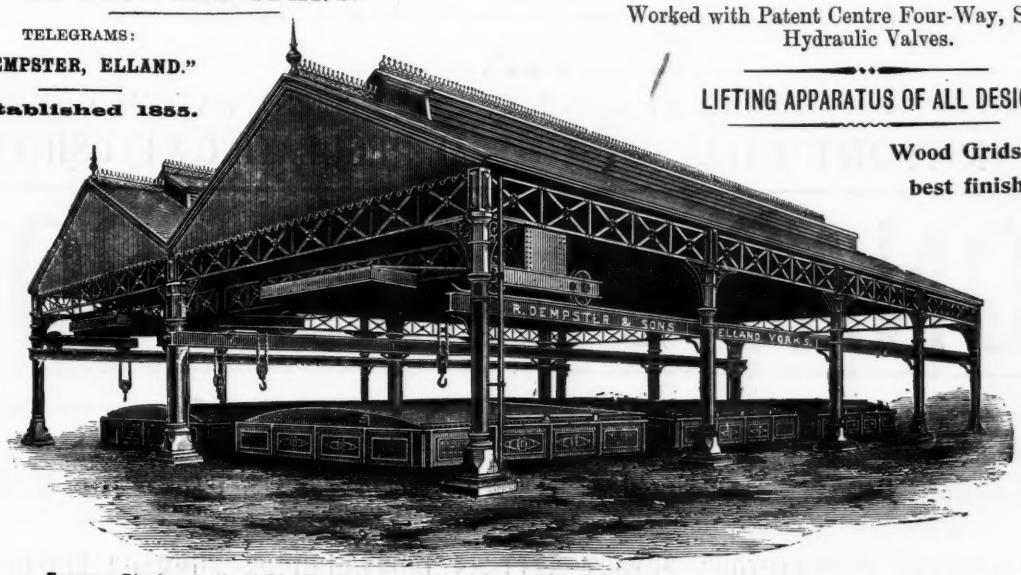

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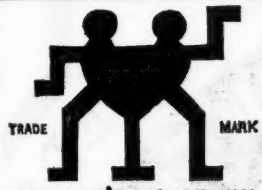

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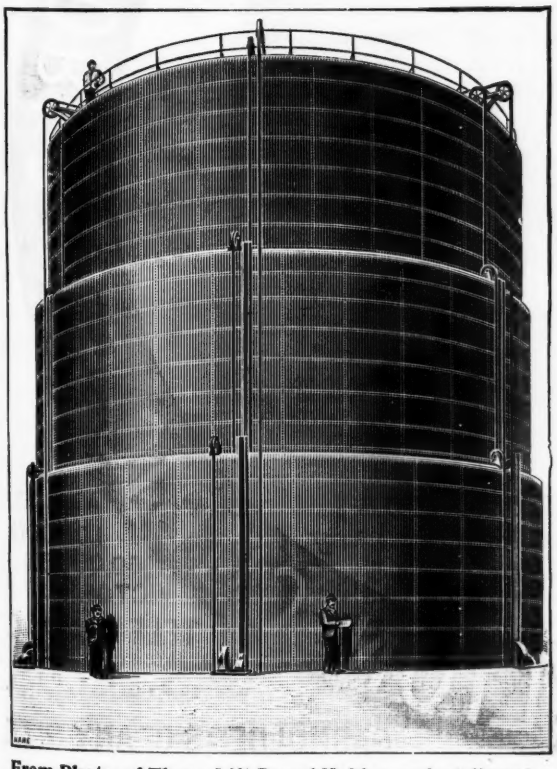

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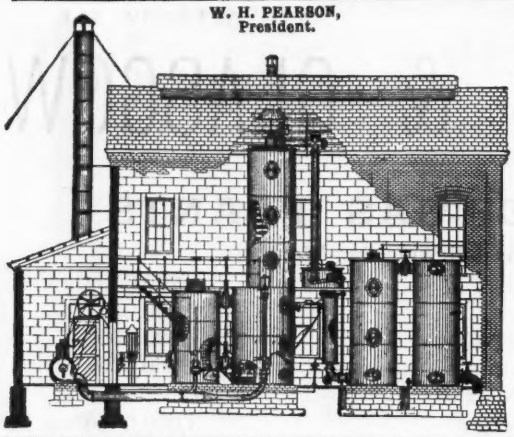

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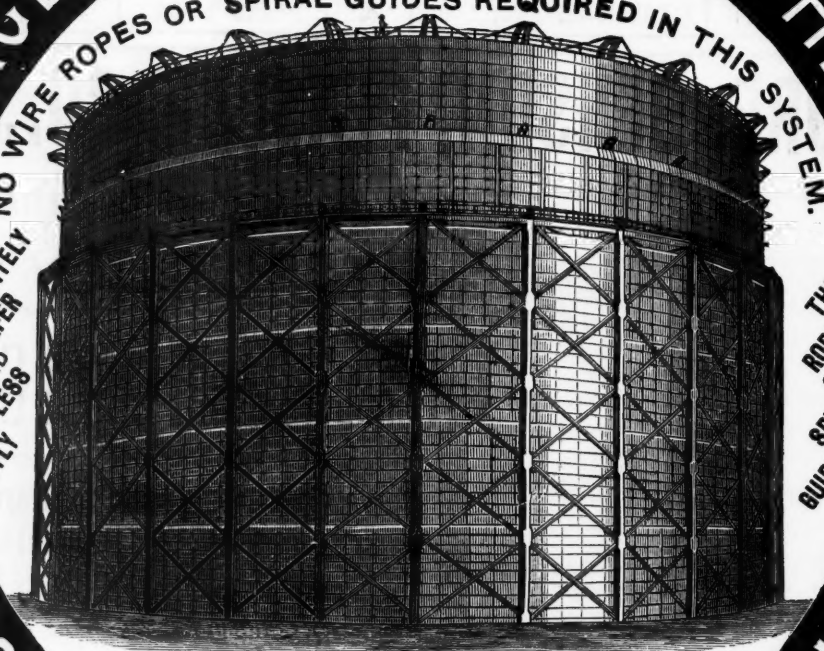

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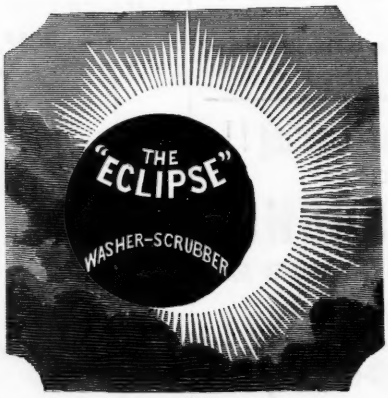

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